THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. FEBRUARY 14, 1895 CHICAGO, ILL. NUMBER 7.

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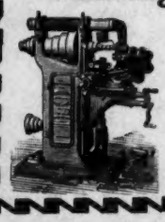

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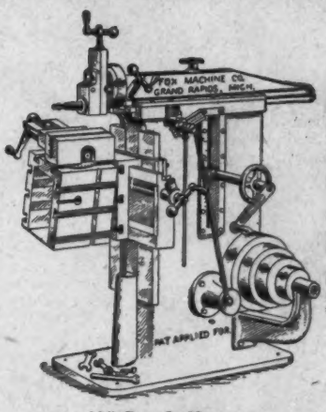

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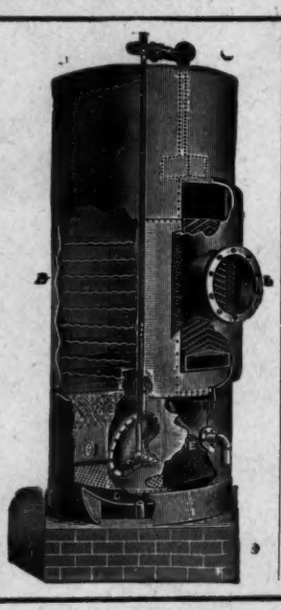

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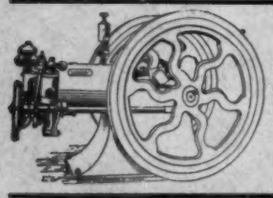

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THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. FEBRUARY 14, 1895. CHICAGO, ILL. NUMBER 7.

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Two weeks of February have brought somewhat more encouragement to the iron trade than was to be found in the course of January business; yet all statements are merely comparative. There are intimations of what some of the more important railroad lines will do in the rail and car markets, but nothing that has materialized up to this time in these directions has made any impression. Bridges, elevated work, office structures and shipbuilding have furnished the bulk of the tonnage that has gone into the mills since the year opened. Add to these the requisitions for agricultural machinery, for cast pipe, for wire and wire nails, and the main avenues into which mill products have gone have been named. The past month has seen further accumulation of pig iron stocks in the hands of producers, and so far as foundry and forge are concerned the statistical position and the course of prices have kept even s ep. But February has brought more buying in certain centers and the movement has begotten the feeling that contracts covering several months are safer for the buyer than at any time in the past 12 months. Much is being expected of the coming spring, and once the mills actually get in hand any considerable percentage of the tonnage that has been coming to the inquiry stage and then waiting, the situation will take on a different aspect in all raw material lines. Southern furnace firms note a better buying movement this month, but the reports as to prices indicate that there is still much to be desired. Eastern advices refer to a slightly improved inquiry for material of all kinds since the abatement of the severe weather, but it is also noted that there are contradictory signs in nearly every department of the market, with no positive indications as to which set of influences will dominate the immediate future. In the CentralWest, shipbuilding has furnished an almost weekly quota of orders since the first of the year. The latest project that promises tonnage in this line is that for 18 steel canal boats to run from Cleveland to New York through the Erie canal At Pittsburg the situation as to Bessemer pig and billets is practically unchanged, with $10.10 and $15 10 respectively as the market. Billets are scarcely as firm as one week ago, a 4 000-ton transaction in the Cleveland district having been made at a figure shading $15.50 Cleveland. A 15,000-ton lot of wire rods has been purchased by a prominent Western concern at a figure below the $21.75 Pittsburg basis, for which a large selling interest has been contending. Pipe business that is coming up in the East will amount to a good tonnage; between 50,000 and 60,000 tons will be placed within another month. Contracts for several thousand tons were closed last week with New Jersey foundries at a price lower than the last. One railroad contract for rails is reported, which calls for "40,000 tons or any less amount" in 1895. A New England contract for 1,500 tons of light plates went to Central Pennsylvania at a low price.

THE CLEVELAND OUTLOOK.

No official announcement of iron ore prices for 1895 has been made, and there has been no pressure from buyers to know what the basis will be. In some quarters the feeling has grown, since the January experience as to prices of nearly all iron and steel products, that the announcement of the slightly advanced rates talked of for Bessemer ores would be of some assistance in arresting the downward tendency. It does not seem likely now that anything will be done on 1895 contracts before March. Sales from the dock have been made in the past week, in lots of from 5,000 to 10,000 tons.

Pig Iron. Several New York and New England orders of considerable size have been placed with valley firms the past week, for foundry iron—an indication that some buyers fully appreciate that the present basis secures them against the steady decline they have seen in the past several years. We quote No. 2 foundry at $9@$9.25 at furnace and forge at $8.50@$8.75 in the valley, though the transactions in the latter have been very light. Bessemer pig has not changed in the week. Some inquiries are reported and there are limited transactions at $9.50@$9.60, valley furnace, prompt delivery. Stocks are larger than at the first of the year, but there are producers whose views of the probabilities of spring demand lead them to turn down offers on the current basis. A margin of close to $5 is still preserved between Bessemer pig and billets. In the latter, two sales are reported in Cleveland the past week, one of 4,000 tons at a price shading $15.50 delivered and the other of 1,500 tons. The new Youngstown steel plant has had the usual experiences incident to starting up, one or two other break-downs following the one reported one week ago; but nothing that will long hamper operations. It is reported that a second Ohio furnace has entered into an arrangement by which its Bessemer pig output will be delivered at Lorain, the ores and all other materials being furnished by the steel interest.

Finished Material. The steel for a new barge to be built in Cleveland—some 1,500 tons—was bought the past week, Pittsburg taking the business. Somewhat more activity is noted in boiler plates. Bridge building demand is of small proportions. On beams and channels a moderate inquiry is reported and prices are as last given—1.20c@1.30c, Pittsburg. Specifications on back contracts have been made more freely of late and the mills have operated on a better schedule. In bars, prices and volume have been without change. A Buffalo car works has been in the market for bar iron for several hundred cars.

THE CHICAGO OUTLOOK.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Business was quite a little quieter last week in nearly all branches of the iron and steel trade than it was the week before, the only order of any size that was placed being the contract for the 28,000 tons of structural material for the Northwestern elevated road. Pig iron sold in small quantities only, except in a single instance. Bars were in little demand. Rails have good prospects for the future, but no business was placed last week. One lot of billets was sold, and other classes of material were only in light demand.

PIG IRON.—The sales of Northern iron last week were rather lighter, no orders larger than 500 tons being taken, and the balance of the business closed being principally in small lots of from 200 tons down. There were several new inquiries received, and it seems likely that the next few weeks will at least be as good as the past two or three, if not better. Prices are unchanged, and are being held quite firmly by all the furnaces. Deliveries are being hurried on old contracts, as consumers as a rule are taking more than they had contracted for. Southern iron has done a little better than local, the largest sale being of a 1,000 tons, with several 500-ton orders closed. Besides these, quite a good business was done in smaller lots, of 400 tons down. The inquiries that were in the market are nearly all filled, and unless something new comes up within the week, the outlook for Southern iron is hardly as good as it was a week ago. Quotations are unchanged from last week, but charges of cutting are heard on every hand, and it seems likely that some of the orders taken were at lower prices than those we quote. Deliveries are good, and some of the Southern furnaces are reported as being short on certain grades for the next several weeks. Our quotations are as follows:

Lake Sup. Charcoal	$13 00@13 50	Southern No. 2 Soft	$10 00@10 25
Local Coke Fdy. No. 1	10 25@10 50	South'n Silveries No. 1	11 50@11 75
Local Coke Fdy. No. 2	9 75@10 00	South'n Silveries No. 2	11 25@11 50
Local Coke Fdy. No. 3	9 40@ 9 65	Jackson Co. Silveries	15 50@16 00
Local Scotch Fdy. No. 1	10 25@10 50	Ohio Silveries No. 1	14 00@14 50
Local Scotch Fdy. No. 2	9 75@10 00	Ohio Silveries No. 2	13 00@13 50
Local Scotch Fdy. No. 3	9 50@ 9 75	Ohio Strong Softeners	12 50@13 00
South'n Coke No. 1	11 00@11 25	Alabama Car Wheel	17 50@18 00
South'n Coke No. 2	10 00@10 50	Malleable Bessemer	11 00@11 50
South'n Coke No. 3	9 75@10 25	Coke Bessemer	11 00@11 50
Southern No. 1 Soft	10 25@10 50		

BARS.—Of the inquiries reported in the past two weeks for bars, only one or two of the smaller ones have been filled, and it is not certain how soon the others will finally be disposed of. No new business in large quantities has come up. General business, in small lots, is quite good, the only trouble being that some of the mills are disposed to take orders at almost any price they can get, apparently. Quotations are still made for 1c for common iron, but it is asserted that sales have been made considerably under this. Guaranteed iron is quoted at 1.15c, and soft steel bars from strictly billet stock, 1.20c.

RAILS AND TRACK SUPPLIES.—The tonnage closed in the past week was small, and was confined to orders for only small lots. Some figuring is being done for large quantities by some of the larger roads, and it is quite likely that they will close within the next few weeks. Prices are unchanged, and although some buyers appear to think that it will be possible to get rails at a little under these figures, the mills say they are standing firm at the agreed prices. Rails, $23 to $25; splice bars, 1.25c to 1.30c; track bolts, 1.95c to 2c; spikes, 1.65c. to 1.70c.

BILLETS AND RODS.—A sale of 7,500 tons of billets was made last week which leaves the market entirely clear from inquiries. Quotations are still made at $16.50 to $17. There is a considerable improvement in the demand for rods, and several large inquiries were received last week, which will probably be closed some time in the present week. Prices are unchanged at $23 to $23.50.

STRUCTURAL MATERIAL.—Although nothing definite could be obtained regarding the contract for the 28,000 tons of material for the Northwestern elevated road, it is pretty well understood by the trade that the order went to a New York bridge building concern, which means that the material will be made at Pittsburg. This was a surprise to most of the bidders, as it was generally understood up to the middle of the week, that a Pennsylvania concern would get the business. The building in Buffalo, requiring 5,000 tons of material, noted last week, is not yet let, but probably will be some time this week. General business is rather quiet, but still a fair number of orders have been secured at ruling prices. Beams and channels, 1.45c to 1.50c; angles, 1.30c to 1.35c; plates, 1.40c to 1.45c; tees, 1.55c to 1.60c. Small lots from stock are quoted at ¼c to ½c higher.

PLATES.—Very little business was done, and that only in orders ranging in size from carloads down. Prices are unchanged at 1.35c to 1.40c for tank steel; flange steel, 1.50c to 1.75c; firebox steel, 2c to 5c; boiler tubes, weak at 75 per cent discount.

MERCHANT STEEL.—Business is being done only in small lots, but small orders are quite frequent, so that the volume is fully as good as could be expected. Quotations are being maintained as follows: Open-hearth spring, tire and machinery steel, 1.65c to 1.70c; smooth finished tire and machinery, 1.50c. to 1.60c.; Bessemer bars, 1.35c. to 1.40c.; tool steel, 5.50c to 7.50c.; specials, 11c. and upwards.

SHEETS.—There is a considerably better inquiry, and some sales of good size were made, for future delivery. A still better business is looked for in the near future. Quotations are made at 2.30c to 2.35c for No. 27 common iron; steel sheets are quoted at 2.40 to 2.45c; galvanized sheets, 75 and 10 per cent discount.

OLD RAILS AND WHEELS.—Offers of $9.75 to $10 are made for old iron rails, but holders do not seem inclined to sell at such prices, holding for $10.50 and higher. Old steel rails are quiet at $6.50 to $7 for short, and $8.50 to $9 for long lengths. Old car wheels are dull and in small demand at a nominal quotation of $8.50.

SCRAP.—No business of any size has been done, and prices are very weak at the following: No. 1 forge, $8 to $8.50; No. 1 mill, $6.50; No. 1 machinery, $6.75; axles, $12.50; cast borings, $3.50; wrought turnings, $5.25; axle turnings, $6.25; mixed steel, $5; heavy cast, $7 to $7.25; stove plates, $5 to $5.25; heavy melting steel, $6 to $6.50.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg. The severity of the weather during most of the week under review, and the firmer prices still maintained in Bessemer pig and soft steel billets, have operated to limit transactions. The market for Bessemer pig is fully as firm as in the preceding week, and $10.15 is the ruling figure, with here and there a transaction, involving small tonnage, at 5c. or 10c. better. The valley furnaces are making no effort to sell material for prompt delivery in this market, a number of them having contracts covering the next two months. The suspension of the Steubenville Furnace, to repair the damage done by the recent explosions, has resulted also in some call from the Wheeling district for pig iron from the valleys. Foundry demands are light, and prices drag. Mill iron has sold at $9.10@$9.15, with an improvement in demand the past

week, several good sized sales having been made. The coke production of the Connellsville region has been heavy since the first of the year, averaging about 150,000 tons a week, or 675,000 tons in January. The shipments have exceeded the production, reaching the remarkable total of 8,442 cars in the week ending Feb. 2. There is an evident policy on the part of some furnaces to stock surplus coke. In some cases contracts at 90 cents will expire April 1 and there is no certainty as to price after that date. The mills continue firm in their quotations on steel billets; $15.10 to $15.20 is the range on current transactions for prompt delivery. Sales are of small volume, but in view of the sold-up condition of most producers, a further advance is talked of. The large structural contract at Chicago will probably land in Pittsburg mills, as local bidders have all along maintained. This, with Pittsburg's share of the Long Island bridge work and the office buildings that have brought orders to Pittsburg, make the outlook for structural work very encouraging. Skelp iron has advanced about 50 cents a ton the past week, and some of the inquiries made a week ago for both skelp iron and steel have resulted in sales. A sale of wide sheared skelp steel is reported at 1.17½.

Cincinnati. There is no question as to the improved tone and volume of business since the first day of February. Orders are placed for large tonnage with much less hesitation, and shipments are ordered forward at a more rapid rate than has been the case at any time for three months. At the same time, a good deal of complaint is heard from manufacturers that new work is coming forward very slowly, and in some lines there is dullness amounting to stagnation. In other important lines, new enterprises keep suggesting themselves by inquiries and correspondence, but fail to come to a head. One thing that gives encouragement is the subsidence of the scare in relation to the country's finances. There is no longer any fear that we are going to a silver basis, or that there will be any contraction of currency or serious disturbance of credit. Money continues cheap and abundant, and no worthy and promising undertakings will fail because money cannot be had to carry them out. There has been no recovery of prices, but taking the field together, it is probable that the increased activity has resulted in a slightly lower level for most kinds of iron. In Bessemer pig and steel there has been an appreciable advance. It would not take much further improvement in demand to move the figures up several pegs; for ore interests, vessel interests and coke interests, that have been bearing heavy burdens to prevent complete stoppage, are all anxious to establish a small advance that will at least prevent loss, and allow for wear and tear and interest. The extreme cold weather that has prevailed in all parts of the country, accompanied in many places by storms, has interfered seriously with traffic, and has also stopped work in many foundries and mills. This interference, however, is but temporary.

Buffalo. It can almost be said that the market has taken a turn. A slight firmness is visible, with a little more inquiry and buying. The improvement is not so pronounced as to convince buyers, but it serves to give hope to sellers.

St. Louis. The improved condition of the iron market is in marked contrast to the exceedingly dull and depressing period that we have just passed through. There is more encouragement all along the line, and unless signs fail, there will be a good demand for iron. Prices of pig iron, through lack of consumption, have been forced down to a rock bottom basis, and buyers are placing orders with less fear of having iron offered them at lower figures before their order is completed. It is noticeable, too, that the orders are gradually increasing in volume.

LAKE SUPERIOR IRON MINES.

The annual meetings of the Duluth, Mesabi & Northern Railway Co., and of the Mesabi mining companies included in the Lake Superior Consolidated Iron Mines, were held at Duluth last week. The boards of directors of the mining companies were reduced to three members each and of the railroad company to seven. Action was taken by the mining companies terminating the 1,000,000-ton ore contract with Rockefeller. This was made in 1893 and was a part of the arrangement by which advances were made by Rockefeller for the development of the properties. Hereafter shipments will be made in the usual way. It is reported that the report of the railroad showed net earnings of about $200,000, after paying operating expenses, fixed charges and interest on bonds. The total receipts were close to $1,300,000. Nearly all the bonds and stock are held by Rockefeller. The first mortgage bonds are $2,200,000; second mortgage bonds, $1,900,000. The newly elected directors of the railroad are F. T. Gates, A. D. Allibone, A. D. Thomson, A. McDougall, H. C. Merritt, W. J. Olcott, J. B. Cotton; Fred T. Gates, president; A. D. Allibone, first vice-president; A. McDougall, second vice-president; A. D. Allibone, treasurer; S. R. Payne, secretary; G. Wellwood Murray, general counsel; J. B. Cotton, attorney; D. M. Philbin, general manager; E. V. Cary, assistant secretary. The three directors of the mining companies are W. J. Olcott, J. B. Cotton and A. D. Allibone. The officers are: W. J. Olcott, president and superintendent of mines; J. B. Cotton, vice-president; C. E. Scheide, treasurer; G. D. Swift, secretary and assistant treasurer; E. V. Cary, assistant secretary; George Wellwood Murray, general counsel; J. B. Cotton, attorney. The annual meeting of the Lake Superior Consolidated Iron Mines will soon be held in New Jersey.

A decision was made last week by the Supreme Court of Wisconsin in a suit growing out of the Gogebic boom. It was claimed that the capitalization of corporations in an amount largely in excess of the actual value of the property of the corporation is a fraud upon the purchasers of the stock where no notice of these facts is given. Mrs. Helen M. Warner bought from H. S. Benjamin and F. A. Bates in 1886, stocks in the Bourne, Nimikon, Bessemer, Kakagon, Prospect Hill and Sunday Lake iron mines. Each of these mines was capitalized at $1,000,000, whereas, it was alleged, the real value of each was but $300,000. There were 12 assignments of error in the appeal, but the question as to whether there was a fraud upon the purchasers of the stock was the one of prime importance. The case was remanded to the lower court for re-trial, and the judgment for $19,000 obtained in the lower court, by Mrs. Warner, was set aside.

The taxes on the Metropolitan Iron & Land Co.'s property at Ironwood, Mich., for last year were $61,000, nearly half the total tax collected by the city. The tax was paid under protest, the company claiming that the levy was excessive, and suit has been brought to recover a portion of it.

A bill has been introduced in the Michigan legislature making one cent per ton per mile the maximum charge for hauling iron ore in that State. The Chicago & Northwestern already more than complies with the bill. Its 65-mile hauls are made for 52 cents. The Duluth, South Shore & Atlantic, on hauls of 12 to 15 miles, is getting over two cents a mile.

Diamond drill work has been actively followed up by the Lake Superior Iron Co. the past year. It has not yet struck ore in the lake bottom near its Hematite mine, but the drill went through paint rock and it is expected that a continuation of the Cleveland Cliffs Co.'s deposit will be struck. The main shaft of Section 16 mine will be sunk 100 feet deeper in the next three months. It is now 130 feet deep. The development of the ore body at Section 21 mine is now in progress, with indications that it is extensive and of marketable quality.

At the Champion mine 100 men are at work and about 2,000 tons a week are mined. The crushers will not be started for several months.

THE IRON TRADE REVIEW

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FEBRUARY 14, 1895.

HEALTHY IRON AND STEEL EXPORTS.

THE compilation, by the Treasury Department, of the statistics of imports and exports of the United States for the year 1894, has just been finished. It is opportune that these figures come out just as the representative manufacturers of the country who formed the National Manufacturers' Association at Cincinnati have returned to their homes to take up in a practical way the campaign for larger outside markets. Certainly the statistics emphasize much that was said at Cincinnati of the importance of this foreign trade, which, while small in itself, derives its significance from the fact that it is added to the splendid total available at home in times of normal business. It is a thing to comment on, that in a period of curtailed buying all over the world, and with values sensibly shrunken from the basis of 1893, the exports of iron and steel and their manufactures should have reached the respectable total of $29,943,729 in 1894. This, against $30,159,363 in 1893, showing a falling off of but $200,000, in spite of the higher basis of values in '93, its five months of prosperity and the assistance throughout its twelve months, of the reciprocity arrangements with Cuba. True enough, this total is but a small percentage of the entire volume of the country's business in iron and steel and their manufactures, but that it should have remained stationary, while the aggregate of domestic trade, expressed in dollars, fell off by tens of millions is strong proof that ground has been gained in our foreign trade, even under the handicaps that the National Manufacturers' Association seeks to remove.

In the following table, taken from the Bureau of Statistics report, are given the total exports of iron and steel and their manufactures in the calendar years 1894 and 1893:

EXPORTS OF DOMESTIC IRON AND STEEL.

	1894.	1893.
Pig iron	$309,222	$379,437
Band, hoop and scroll iron	5,380	10,467
Bar iron	130,374	94,239
Car wheels	113,172	117,443
Castings, N. E. S	484,675	504,893
Cutlery	160,879	173,779
Fire-arms	640,099	704,569
Ingots, bars and rods of steel	50,911	27,743
Locks, hinges and other builders' hardware	2,452,732	2,495,099
Saws and tools	2,019,199	1,886,090
Machinery, N. E. S	10,715,520	10,512,576
Fire engines	22,138	1,700
Locomotives	1,567,464	1,815,017
Stationary engines	257,350	295,989
Boilers and parts of engines	582,683	574,612
Cut nails and spikes	331,143	282,176
Wire nails, wrought, horseshoe, tacks, etc.	196,165	173,275
Plates and sheets, iron	111,586	92,675
" " " steel	53,641	35,885
Printing presses and parts of	160,303	314,563
Rails, iron	32,306	5,059
" steel	323,880	590,929
Scales and balances	292,055	372,419
Sewing machines and parts of	2,064,787	2,456,487
Stoves and ranges and parts of	240,936	235,796
Wire	1,304,794	1,006,014
All other manufacturers of iron and steel	5,320,335	5,000,430
Total	29,943,729	30,159,363

The increased export in some classes of material is worthy of note. Bar iron, ingots and rods, saws and tools, machinery, wire nails and cut nails, plates and sheets, stoves, wire and miscellaneous iron and steel articles all show enlarged foreign trade. In builders' hardware and saws and tools, the increase has been chiefly in the trade with Germany and with Great Britain and British possessions. Our German trade in these articles increased from $243,742 in 1893 to $377,559 last year; that with the United Kingdom from $645,997 to $752,737; with British North America, from $551,385 to $572,180; with British Australasia, from $556,689 to $661,476. On the other hand, for well known reasons, the trade with Cuba in these articles fell off from $570,882 in 1893 to $313,901 in 1894.

The machinery exports, apart from various forms of engines, advanced from $10,512,576 in 1893 to $10,715,520 in 1894. The distribution of this business among the various countries is an interesting exhibit:

EXPORTS OF STEAM ENGINES AND MACHINERY.

	1894.	1893.
United Kingdom	$2,188,471	$2,028,470
Germany	514,033	538,072
France	319,228	312,947
Other Europe	757,549	551,988
British North America	1,330,142	1,546,726
Mexico	1,682,492	1,856,216
Central American States and British Honduras	364,127	357,520
Cuba	1,916,061	2,341,943
Puerto Rico	56,579	72,750
Santo Domingo	309,824	245,744
Other West Indies and Bermuda	231,108	212,213
Argentine Republic	195,627	196,131
Brazil	1,283,592	1,041,972
Colombia	136,704	115,034
Other South America	631,848	688,171
China	40,015	27,341
British Australasia	298,820	245,038
British India and East Indies	12,887	33,722
Other Asia and Oceanica	43,453	314,877
Africa	441,015	461,482
Other countries	2,580	537
Total	$13,145,155	$13,199,894

The noteworthy gains in the above are in shipments to the United Kingdom, to Europe apart from countries named, to San Domingo, British Australasia, and Asia and Oceanica. The falling off was especially in trade with Canada, Mexico and Cuba.

In lines closely allied to those enumerated in the first table printed above, there have also been large exports. Of agricultural implements the total in 1894 was $4,765,793, a falling off from the $5,191,223 This difference is more than accounted for by the financial troubles in Argentina, the exports to that country dropping from $1,703,239 in 1893 to $1,202,934 last year. There was an increase from $568,514 to $627,517 in shipments to the United Kingdom; from $379,437 to $536,443 in German business, and from $289,044 to $385,435 in shipments to Africa. Brass and its manufactures were exported in 1894 to the amount of $779,875, against $741,317 in 1893. In carriages and street cars, the total was $1,601,010 last year, against $1,653,833 the year previous. Passenger and freight cars for steam railroads declined, however, from $1,930,960 to $696,366. Copper ingots and bars totaled $15,324,925 in 1894; in 1893, $14,213,378. The fall in values appears in the fact that the total for 1894 was 162,393,000 pounds, and in 1893 but 138,984,128 pounds. Manufactures of lead fell off slightly—from $508,090 to $497,993. Manufactures of tin increased from $258,449 to $301,503.

It is apparent from the above statements that the foreign field is worth cultivating; and while home requirements continue below their wonted volume we shall look to see such efforts put forth for these outer markets as shall make them a steadily increasing adjunct of the home demand, in good times and bad.

FOUNDRYMEN who have regularly found the pig iron taken on the fag end of yearly contracts costing them from $1 to $2 above the market are apt to be chary about

long time engagements; but if some of the reported offers of furnaces in the past month are bona fide there is excellent reason to believe that buyers who cover for the balance of the year will have one chance, at least, of evening up old scores.

ONE prime object of the Foundrymen's Associations that have been doing such excellent work East and West, the past few years, is, we take it, to make available to the entire membership the results of the experience and research of individual members, as presented from time to time in original papers. Many valuable contributions to foundry literature have been made in these papers, most of them presenting the results of original investigation. There has been no occasion heretofore, to question the *bona fides* of any who have come before these organizations with papers or addresses, and we regret very much to note an exception in the paper presented at the last meeting of the Western Foundrymen's Association. Paragraph after paragraph is an exact transcript from Chas. W. Sisson's "A B C of Iron," which has been in the hands of the foundrymen of the country for the past two years. While Mr. Sisson did not claim originality, much of his work being the compilation of familiar facts about the influence of the metalloids in cast iron; yet in condensing and simplifying the technical statements of the chemists, he really made the book his own. The paper in question so faithfully reproduces Mr. Sisson's language in many paragraphs, that there is no question as to the source of quite three-fourths of it. We regret to be compelled to refer thus to this matter, but there is satisfaction, at the same time, in the reflection that the instance is an isolated one and is not likely to be paralleled.

Western Foundrymen's Association.

The regular monthly meeting of the Western Foundrymen's Association will be held at the Great Northern Hotel, in Chicago, at 7:30 P. M., Wednesday, Feb. 20th. The evening will be devoted to a "Question Meeting," and each one who comes is requested to bring with him some question regarding foundry practice on which he would like the views of the members present.

All members are requested by the Secretary to have a representative present, and to non-members a cordial invitation is extended to be present and to take part in the discussions of the questions that may be presented.

HENRY WARNER was appointed receiver, at Pittsburg, Feb. 11, for the Linden Steel Co., on the petition of W. J. Lewis and Jones & Laughlins, Ltd. The corporation owes $485,000. Of this $440,000 is secured by mortgage on the mill property. One mortgage was given Aug. 16, 1893, to the Pittsburg Trust Co. to secure debts aggregating $388,353 39. There is still unpaid on this mortgage over $300,000 and a portion of this amount matures Feb. 16, 1895. Owing to the financial stringency, it was claimed, the company is unable to pay its debts as they mature, but it was stated in the petition that if the property can be kept in proper condition and its sale piece-meal on executions prevented, the company could eventually pay its debts. The assets are valued at $685,000. Since the extension in August, 1893, no new debts have been created and a considerable portion of the old indebtedness has been paid.

EUGENE L. MAXWELL, of Manning, Maxwell & Moore, New York, well known and highly esteemed in the machinery manufacturing world, died at Brooklyn, Feb. 9. He was president of the Pond Machine Tool Co., the Ashcroft Mfg. Co., and the Shaw Electric Crane Co.

E. G. POWELL, vice-president of the Gobeille Pattern Co., of Cleveland, died at Kansas City, Mo., Feb. 10, aged 50 years.

PRODUCER GAS IN IRON AND STEEL WORKS.

Geo. T. Prince, of R. D. Wood & Co., Philadelphia, read a paper on "Gas Producers" at the meeting of the Foundrymen's Association in Philadelphia, Wednesday evening, Feb. 6. The general question of the adaptation of gas to the iron and steel processes was treated in a paper, and special reference was made to some of the foundry requirements to which gas had been successfully applied. The speaker referred in his introduction to the small part of the value of coal utilized in certain processes of iron and steel production. "In an average puddling practice, only about five per cent of the heat from the coal burned enters the iron, the remaining 95 per cent passing off by the chimney, or being lost in radiation. It is true, however, that oftentimes this loss can be reduced fully 25 per cent by allowing the waste gases to pass through overhead boilers, and this is the usual custom in cases where the steam so generated can be utilized. In the best open-hearth practice about 18 per cent of the value of the coal is absorbed by the steel. Much of the heat is unavoidably lost, owing to the unsatisfactory condition attending the combustion of coal, requiring as it does the heating of the combining air. Until other methods are discovered whereby the heat can be drawn from the fuel without the aid of air, or the necessary thermal energy to successfully treat the iron or steel to be applied through some other medium than ordinary combustion, as for instance, electricity, we can hope to realize but a small amount of heat energy employed."

Mr. Wood then proceeded to discuss in order these questions: What is producer gas as commonly termed? How is it made? In a general way what are some of the principle advantages attaching to its use? How will these advantages apply to foundry work both iron and steel? A mixtnre of air and water gas, it is stated, is the form of producer gas commonly employed. When air alone is used to supply the oxygen required to gasify the coal, "air gas" is produced. In this process, for every pound of oxygen admitted in the blast, there are present 3.35 pounds of nitrogen, which not only does not develop heat but abstracts heat from the fuel. The best modern practice furnishes about one-fourth of the required amount of oxygen through the introduction of a steam blast. The speaker then explained the objection to the use of air alone in blowing the producer—the loss through radiation of the sensible heat evolved. To remedy this possibilty of loss, the sensible heat in excess of what is required to maintain a proper incandescence of the fuel bed, say 600°F., is utilized in dissociating water, changing its character from sensible to latent. No claim is made for any increase in the calorific value of the gas due to such dissociation. The effect of steam in preventing the hardening of clinker is another reason of its introduction in the blast. When applied below the grate, there must be a uniform distribution of the blast, and attention must be given, to guard against the blast being choked by an accumulation of clinker and being forced to the walls of the producer, the point of least resistance. These points are considered in the construction of the Taylor revolving-bottom gas producer, which applies the blast through a central tuyere pipe at the base of the fuel bed. The result is a uniform gas both as to quality and quantity.

"Producer gas is being rapidly adopted in almost all lines of industries involving the application of heat in large volume. The inducements for its use are cheapness of fuel, labor saved in maintaining separate fires, more uniform heat throughout the furnace and when regeneaation is employed it is possible to obtain a temperature 30% more intense than with coal directly fired. With anthracite coal in gas producers, there is practically no soot, and the amount of ash should not exceed what is in the coal plus a half of one per cent of the coal charged. With bituminous coal the amount of soot is very largely reduced and the ash practically what is in the coal.

"It might be asked, why can a pound of coal develop more heat by being transformed first into the gaseous state as in a gas producer, and subsequently burned than would be the case if the same coal were at once consumed in the furnace from the solid state? To this, I would answer: First—the coal is more thoroughly burned in a properly designed gas producer than upon grate bars. Records of six weeks' duration of or-

[Continued on Page 10.]

62-INCH DOUBLE HEAD LATHE.

The Niles Tool Works Co., Hamilton, O., has built for special work at the League Island Navy Yard of the Government a heavy and powerful lathe of entirely new design. The accompanying cut is the reproduction of a photograph and shows faithfully all the parts of the tool.

The bed is about 63′ long and about 58″ wide. At each end is mounted a complete head-stock, tail-stock, carriage, steady-rest, etc., making two complete lathes, facing in opposite directions. On one side the lead screw is run the full length, so that when one set of the upper works is removed it will take over 50′ between centers. The second lead screw is made for a distance of about 20½′ between centers.

The full swing over ways is of 62″ diameter, and over carriage 48″ diameter. The head-stock is arranged with two sets of back gears, which may be used together or independently as desired, thus giving 20 speeds to the face-plate with one countershaft speed. The cone has five steps of large diameters for wide belt and runs about 105 revolutions to one of the the face-plate, with all gears set. The speed of the face-plate is from one to 57 revolutions per minute. The face-plate gear is 1¼″ diametric pitch, 6″ face; all other gearing is in proportion. All pinions are made of steel.

The spindle is of large diamter and of great length, running in the best gun-metal boxes.

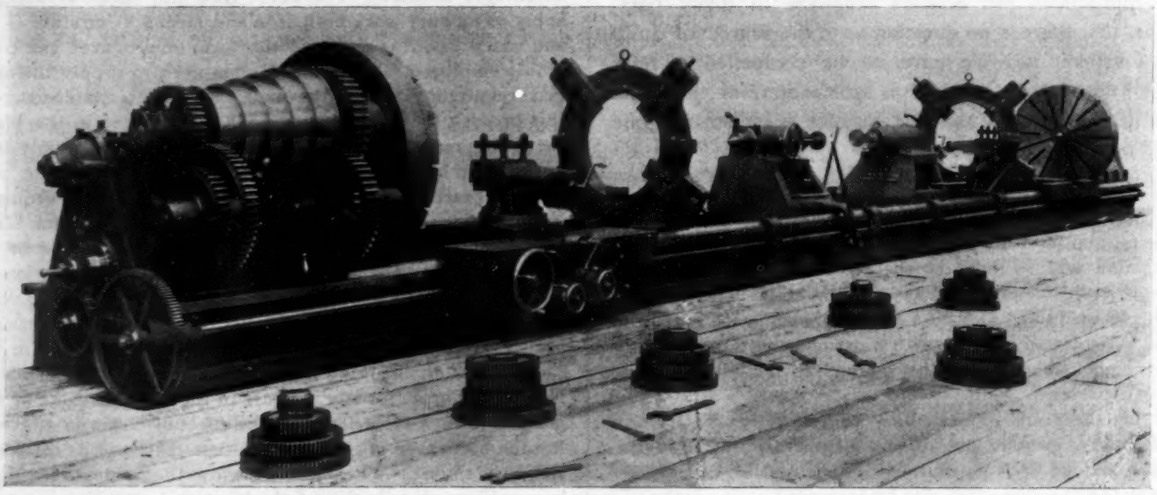
The head and tail-stocks and carriages and large bearings on the bed are proportioned accurate y.

The tail-stock spindle is of steel, 7″ diameter, and has a range of motion of 20″. The total length of the carriage on ways is 78″. The back rest has five jaws of sufficient range to take work from 26″ to 36″. The length on the bed is over 21″.

The lead-screw is large diameter and heavy pitch and the rack is of steel, the face of the teeth being 3″. The head-stock has three sets of feed gearing operated by the usual pull pin, the shaft being very large to insure greater strength at this point than is usually provided. The lead-screw is splined to drive the feeds without the use of the nut so that accuracy of the screw is not impaired by wear except in actual screw cutting. The usual change-gears are provided.

The apron has a locking device, which makes it impossible to set the nut for screw-cutting and the other feeds at the same time. All bolt-heads and nuts frequently used are case hardened and two sets of countershafts, wrenches, etc., are furnished with the lathe.

All the details are proportioned for the heaviest duty and the gears are made either of steel forgings, steel castings, or semi-steel, the latter a tough, close-grained mixture, possessing the highest wearing qualities. The gross weight of the machine is about 150,000 pounds.



62-INCH DOUBLE HEAD LATHE.

MR. F. L. DONALDSON, the Chicago representative of the Indiana Iron Co., of Muncie, Ind., and the La Belle Iron Works, of Wheeling, W. Va., has moved his office from 334 The Rookery, to room 827, in the same building.

QUAST GAS AND GASOLINE ENGINE.

From a photograph we reproduce a view of the Quast gasoline engine of the type adapted to general uses. In an issue of some months ago the engine was shown in use for traction. Since the organization recently, of the Quast Gas & Gasoline Engine Co., of Bucyrus, O., to put this engine on the market, rapid progress had been made and the company will soon be in shape to execute orders for engines applicable to the entire range of service. In connection with the view of his invention, Mr. Chas. Quast, from whom the company takes its name, sketches briefly as follows some of the principal efforts of inventors in the employment of gaseous fluids, and directs attention to the prominent features of the Quast engine:

The first engine embodying the use of gases, which can lay any claim to notice, was invented about the year 1863 by M. Lenoir. In this motor, air and coal gas in proper proportions are introduced into a cylinder, which is then closed, and the mixture exploded by electricity. The explosion causès a sudden increase of temperature and pressure; the gaseous mixture expands, driving the piston before it until the out-stroke is completed, and is then expelled during the return stroke. The irregularity of the ignitions, together with the large quantity of gas required, prevented the extensive adoption of this motor. The maximum pressure, in some cases, was obtained near the end of the stroke, just before opening the exhaust port, instead of being at the beginning of the stroke.

Since the date named nearly 700 patents have been taken out, and from an examination of these it would seem as though there was nothing further left to invent. Nevertheless, each year gives rise to ideas that are new in their application, even if not novel in themselves. The inventors who followed Lenoir set themselves to improve the double-acting engine. Now they are endeavoring to apply the four-cycle plan of Beau de Roches. Is this arrangement likely to be final? Will no better plan be discovered for rendering the gas engine a successful rival of the steam engine? As yet it is impossible to answer so intricate a question; but pending some radical changes, it is possible to improve existing engines, and to simplify their construction and working.

The fundamental idea of M. Beau de Roches consisted in the compression of the gaseous mixture to the greatest extent practicable before ignition. Manifestly the only way to do this is to use a single cylinder, first on account of having as large a one as possible, and next to minimize the resistance of the mixture. Consequently, for one end of the cylinder, the following sequence of operations takes place during four consecutive strokes: inspiration during an entire stroke; compression during the second (return) stroke; ignition at the dead point and expansion during the third stroke; expulsion of the burnt gas during the fourth (return) stroke.

This engine, it is claimed, fulfills the condition of the largest possible cylinder, and the still more important condition of initial compression. Moreover, the speed of the piston in

proportion to its diameter is the greatest possible, since the work usually performed in two strokes is accomplished in one. In 1863 Mr. Hugon brought out his motor, in which ignition was affected by a gas flame controlled by a slide. The arrangement was ingenious, but the motor had only a moderate success.

Thus briefly stated are the results of the most recent investigation into the working of the gas engines, not because it very materially alters the greatest possible efficiency, but because it shows the complex chemical action which will have to be borne in mind in any attempt at improved working. The total heat given to the fluid is the same whether dissociation takes place or not, but the way in which the heat is supplied and the range of temperature are affected by it. The maximum efficiency of a motor using 22 cubic feet of gas per hour per indicated horse power—employing a mixture of one of gas to 12 of air, compressing before ignition, and expelling the products of combustion at the usual temperature, viz: 430 O. C.—is 0.74, being a maximum efficiency 4½ times that of a good steam engine.

The gas engine is comparatively new, yet since the year 1863 the cost of working has been reduced to one-sixth. Today large gas and gasoline engines are successfully operated, some as high as 325 horse power, and soon internal combustion engines will be used in places where at present we think it impossible. Some of our present gas engines, of larger sizes, have reduced the gas consumption to 18 feet per indicated horse power per hour, and the only drawback is the difficulty experienced by some, in obtaining a uniformly even speed of rotation—a difficulty arising from the irregularity of explosions, which is caused by the action of the governor. The results of these irregular explosions are noticeable to the eye on the engine and also on the machinery driven thereby.

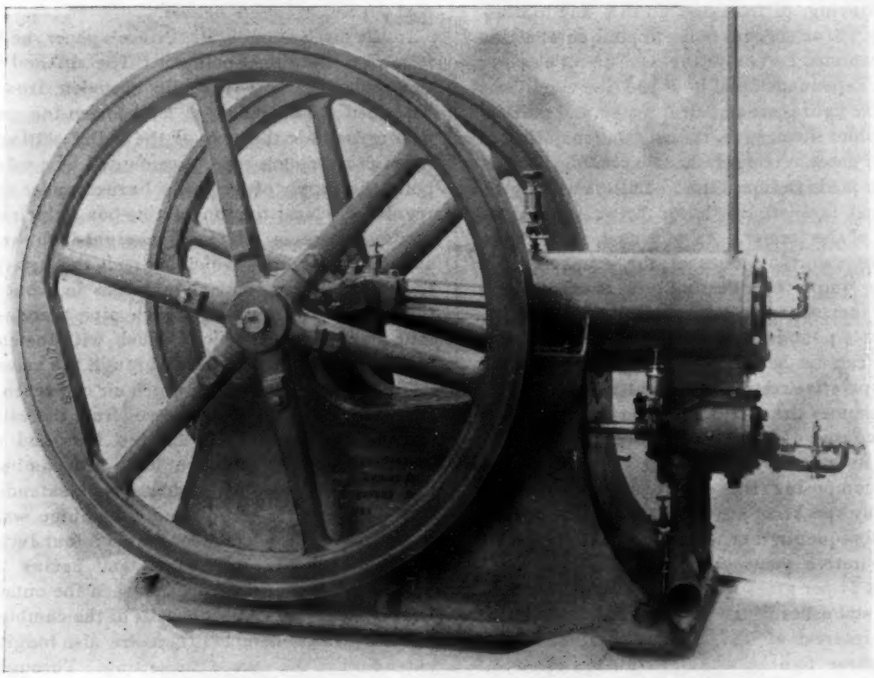
In view of the constantly increasing demand for gas and gasoline engines the one illustrated by the cut is brought before the public. In this engine all the above facts have been considered as far as practicable. An explosion takes place at every other revolution but the force of the explosion is regulated by a governor, which controls the amount of fuel entering the cylinder. The engine operates under the well known four-cycle above described. The novelty in this engine is that there is but one valve, which accommodates both the suction and the exhaust. It is of the rotating type, being automatically oiled and operated in such a manner that cleaning, grinding and regrinding is not necessary.

The ignition of the compressed charge in the cylinder is effected by an electric spark which, without question, is the best possible way. The Quast igniter consists of two small electric cells, which are especially constructed for this purpose. The spark is so strong and effective that so far the speed of the engine has not been high enough to cause it to fail to ignite, although the engine, a 12 horse power actual, was running 950 revolutions a minute, exploding every other revolution. There is no odor to the igniting device, and the chemicals of the cells need not be replenished for two years, but the cells have to be connected to an electric circuit, either incandescent or arc, for about three hours, every six months, which can easily be done, the life of the cells being about six years. The electricity is used in conjunction with the chemicals, which are part of the cells when put up.

A small oil pump, worked and controlled by the governor, draws gasoline from the oil tank underground to the engine and forces it into the air mixer, no vaporizer being used. This takes place only during the out-stroke of the engine piston when it is drawing in a charge. Owing to the valve and igniting arrangement the engine can be run with safety at a high speed and has given great regularity.

This engine, built with two cylinders, is especially adapted to the work of electric light plants. Various tests have given a gasoline consumption of five-eighths of a gallon per horse power for 10 hours. One of these tests lasted three days. Efficiency, economy, quiet and smooth running, general reliability, combined with simplicity and neatness of design, are the chief points claimed for it The engine is started without any delay; the speed and the point of ignition are regulated without stopping the engine.

Electricians lay stress upon steadiness and high speed in engines offered for the lighting field, and this engine has filled the want, because built with special reference to it.



QUAST GAS AND GASOLINE ENGINE.

"PRELIMINARY Report on the Rainy Lake Gold Region" is the title of Part 3 of the 23d annual report of the Geological and Natural History Survey of Minnesota. It is by H. V. Winchell and U. S. Grant. While disavowing any pretension to exhaustive description of the Rainy Lake country and its gold interests, the authors have aimed to present "a report which will give some precise and reliable information concerning this region, the occurrence, richness and necessary treatment of the ores, the geological structure, etc." A good map and several other plates are given. The conclusion of these writers, concisely stated, is this: "There is gold in quartz veins in the vicinity of Rainy Lake. As yet the development is insufficient to warrant the positive assertion that profitable gold mining operations can be conducted there; but in certain localities the prospects are full of encouragement and promise to the conservative operator."

PRODUCER GAS IN IRON AND STEEL WORKS.

[Continued from Page 7.]

dinary, every-day running with the Taylor type of gas producers have shown less than two-tenths of one per cent of total coal charged, to be in the ash. Second—it is possible with gas producers to get a more perfect combustion of the gases with less air than is used with coal fired on a grate. To completely burn a coal of average composition requires theoretically, about 12 pounds of air; it is not only possible, but it is true that very nearly these conditions exist in a properly constructed gas producer plant, under ordinary care.

"Whereas carefully conducted investigations abroad, and also on the part of the United States Government, demonstrate the fact that the average direct-fired furnace will consume from 22 to 24 pounds of air per pound of coal burned, it is true that in the case of some of the modern boiler constructions, as for instance, the Babcock and Wilcox, it is claimed that perfect combustion is obtained on from 14 to 15 pounds of air, under forced draft, but these instances are so rare compared with average practice, as only to serve to establish the truth of the statement that much more air is required to burn coal upon a grate than ought to be used, if thoroughly mixed.

The speaker then introduced a computation to show the extent of these losses, and drew this conclusion: "We thus have a possible saving in the use of gas producers, over average practice in direct-firing, of from 10% to 18% due to heating surplus air. Say 3% on account of incomplete combustion and 4% due to unconsumed carbon in the ash; in all a saving of from 10% to 25%, dependent upon how bad the conditions are. We believe these figures are underestimated, and particularly when we consider heating furnaces, the majority of which discharge their gases at temperatures exceeding 1,500° F.

"Allusion has been made to liquid fuel. This is usually in the form of crude and fuel oil, the latter being the residue from the distillation of the former. As with coal, so there is a wide difference in the calorific values of the crude and fuel oils. If we compare simply the heating powers of coal and crude oil, of average thermal values, we find that a pound of oil is equal to about 1½ pounds of coal. But, because in practice the air supplied can be better regulated in burning oil than in coal, the comparative results are about as 1⅓ to 1 in favor of oil. This assumes the coal burned on the gra e. As compared with coal consumed in a gas producer, the advantage of surplus air is in favor of coal, owing to the fact that the hydro-carbons, composing the oil, require more air to burn them. Generally speaking, probably 1⅓ pounds of coal when gasified and subsequently burned, would more correctly represent the comparative value of a pound of crude oil. With coal assumed at $3 per gross ton, and charging the cost of handling the coal and ashes in the operation of the gas producer, together with interest at 6% on a gas producer plant, the limit at which these figures would fix the price of oil would be about $1\frac{7}{10}$c. per gallon. This limit in price would be considerably reduced by utilizing in this locality, buckwheat coal, and when bituminous is more accessible, nut and slack or even all slack. Apart from its expense, oil does not give the mellow heat obtainable with producer gas, but is rather very localizing in its character, being intense near the point of application, thereby rendering it extremely difficult to obtain a uniform heat throughout the furnace or kiln. If properly applied it is quite possible to get good results, but generally at an increased cost over gas. In the case of small fires, requiring high heats, oil is of special value, but wherever large volumes of heat are required, unless special conditions prevent, producer gas is far preferable.

"The application of producer gas in connection with the drying of cores and molds of pipe castings, has been for several years a success at Florence Iron Works, at Florence, N. J. The chief saving is in being able to utilize an inferior grade of coal, being the No. 2 buckwheat. About two-thirds as much coal is required as when fired on a grate, and taken in connection with the reduced price of the inferior coal, there a saving in expense of about 67% over former method. At the Camden Iron Works, Camden, N. J., producer gas is being used to fire ordinary horizontal tubular boilers. Probably the greatest benefit to be obtained from the use of gas in generating steam, is the increased life of the boiler.

"There is one more point to which I would call your attention, as presenting something of interest to the foundrymen. It is the saving that can be secured by the use of gas engines. The best compound steam engines in every-day running will require at least 2½ pounds of coal per h. p. per hour, and the average small high pressure engine will probably require nearer 10 pounds per h. p. per hour. Gas engines operated with producer gas will perform every-day service on 1½ pounds of coal per h. p. per hour. This is being done at the works of the Otto Gas Engine Co., Philadelphia. I have been told by this firm that they are running their works for one week on the same amount of coal gasified in a producer as they formerly burned in one day when operated with steam. It is customary to use anthracite coal for gas engine work. The gas from soft coal cannot be cleaned sufficiently for this service.

"Special points of interest to which I merely allude, involving some of the physical advantages attaching to producer gas, are cleanliness in and about the works, freedom from the smoke nuisance, the concentration of all labor incident to the delivery and burning of the coal, as well as disposal of the ash. Supplementing what has gone before, it may be of interest to give the average coal consumption in heating and melting of steel, when treated with producer gas. Open-hearth, 600-700 pounds of coal per ton of product; heating, 200-300 pounds from cold steel billets, dependent upon conditions. Soaking-pit work can be done with 38 pounds of ordinary Pittsburg coal per ton of ingots heated."

In the discussion on Mr. Prince's paper, he brought out the following additional points: "The method of applying the gas under the boilers at the Camden Iron Works is thus described: The gas as it issues from the gas main, located underground in the rear of the boiler setting, passes upward through a six-inch pipe surmounted by a valve box at which point the supply of gas to be burned under the boiler can be regulated. Near the top of this box, which is rectangular in section, there is attached an eight-inch wrought iron pipe about six feet long, which extends through the rear end of the boiler setting, and about a foot in front of the blow-off pipe. Inside of this eight-inch pipe there is placed one of four-inch diameter, which is flush with the end of the eight-inch and extends backward through the valve box, having at its end a sloping door, by which air can reach the interior of the gas column. The gas passes from the valve box through the annular space between the four and eight-inch pipe. Under the boiler shell are built two combustion chambers, divided by a central longitudinal wall, extending between the rear of the boiler setting and the bridge wall. The roof of these combustion chambers are of four-inch tile, about six inches below the boiler shell and having the same curve. There is a four-inch space between the outside walls of the boiler setting and the side walls of the combustion chambers, and below the chambers there are also longitudinal passages extending to the rear of the setting. Through these passages air is admitted, controlled by a slide valve attached to the face of the rear wall, and passes forward to the bridge wall, then laterally and upwards into the spaces outside of the combustion chambers before referred to, then backwards to an orifice opposite the end of the eight-inch burners, at which point the heated air is brought into combination with the gas as it issues from the burner, of which there are two under each boiler. The gases are almost entirely consumed within the combustion chambers, products of combustion passing forward toward the crown sheet, back over the roof of combustion chambers, and out through the boiler tubes in usual way. Bricks are laid loosely on the grate, and can be readily removed if necessay, and the boiler fired in the usual way.

"I can refer to no case coming under my personal observation in which producer gas has been successfully applied in this country in connection with cupolas. There are, however, several instances abroad, in which good results have been obtained. In all of these cases, provision is made for utilizing the waste heat to pre-heat the air. 'Mr. Alfred Wilson designed a gas cupola which consumed 2 cwt. of small coal and dross per ton of iron.' This is quoted from 'Chemical Technology,' by Groves and Thorp, which work also describes a more elaborately constructed furnace for melting pig iron after the plan of open-hearth practice. In this latter type, it is stated that 'an average of 1.44 cwt. of coal per ton of metal charged into the cupola was the consumption in continuous working.'"

NEW DOTY COMBINED PUNCH AND SHEAR.

Two forms of combined punch and shear have been brought out by the New Doty Mfg. Co., Janesville, Wis. In the first, Fig. 1, there are two sets for flat iron and one for round iron, in addition to the punch. It is so arranged that the two sets for flat irons are each independent of the other and of the round iron knives, and all are independent of the punch, so that either part of the machine may be used independently of any other, as may be desired. The machine can punch a ⅝-inch hole in ½-inch iron and cut four by ½-inch iron or steel

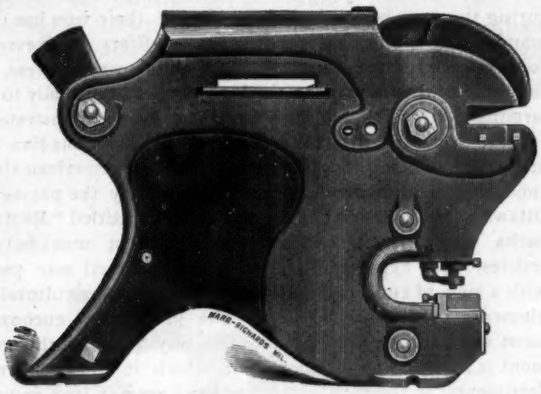


FIG. 1.—NEW DOTY COMBINED PUNCH AND SHEAR.

or one-inch rod iron. The round iron knives are made the reverse of the iron and so do not flatten it in cutting.

In the other machine, Fig. 2, the knives for flat and round iron are independent of each other and of the punch, and both sets of knives, as well as the punch, are at all times ready for use without any change. This machine is powerfully built. The boxes are cast solid, and the eccentric shafts are also cast in one piece. The motion of the machine is controlled by a clutch and treadle. The stripper is adjustable to 0.001 inch and the punches and dies can be adjusted without stopping the machine. Before leaving the works these machines are tested to a strain in excess of that for which they are guaranteed.

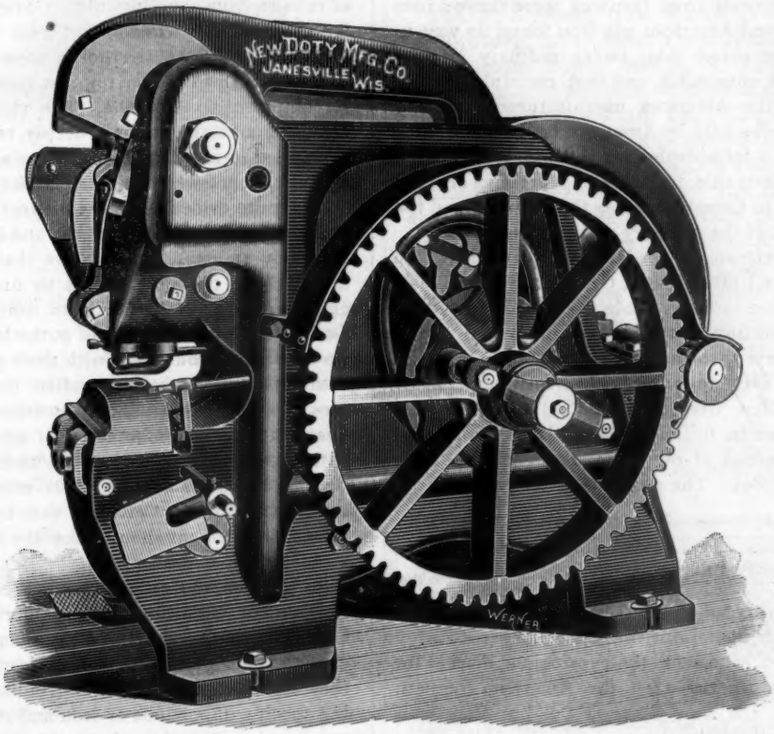


FIG. 2.—NEW DOTY COMBINED SHEAR AND PUNCH.

A Great Bridge for Canada.

The Montreal Bridge Co has called for bids on the most gigantic structure erected in Canada since the completion of the Victoria tubular bridge. It consists of a cantilever bridge across the St. Lawrence from a point near Dalhousie square station to Isle Ronde, and thence to the southern shore of the river. Its length will be about two miles, divided in spans as follows: One cantilever span of 1,250 feet, two side spans of 500 feet each, 15 viaduct spans on the south side of 250 feet each, and 18 viaduct spans on the Montreal side of 240 to 260 feet each. The height of the carriage road on the large cantilever span above the water level will be about 150 feet, a higher altitude than that of the great Brooklyn bridge. The bridge will be so constructed as to allow of a double line of railway track, a double track for electric tram cars, two roadways for carriage vehicles, and footpaths for passenger traffic. The whole cost is estimated at about $6,000,000, exclusive of terminal facilities, which will increase the expenditure by about $2,000,000. It is expected that all the railways converging at Montreal will be ab'e to secure the right of way over the structure. Work will begin on the St. Lambert-Levis section in the spring.

New Annealing Furnace.

Wm. J. Verner, of New Castle, Pa., has designed a new furnace for annealing sheets and plates. The furnace can be charged and the charge removed without permitting it to cool, as is the case with the usual style of furnace. The charge is put in at the top, so that there is not the same opportunity of cooling as when the charging is done at the end. The equipment consists of a bottom weighing about 2,600 pounds, with a wrought-iron box, weighing about the same, and which will hold about 10 tons of sheets, which can be annealed in 24 hours or less. The charge is inserted through the top, the cover being removed. The heat is uniformly distributed in the furnace proper as it enters from the bottom, sides and top. The annealed sheets are softer, of a better color, and are treated more uniformly than with the ordinary furnace.

British Furnaces and Mills That Will Not Go Again.

There are now about 406 blast furnaces standing idle in Great Britain that will never be put into blast again, and 126 finished iron works that will probably never be worked again, says Ryland's Iron Trade Circular. It adds: We do not publish the list with any idea of showing the decline of the iron trade (a subject which is a good deal talked about at the present time), as we are inclined to think that the present stagnation is nothing else than temporary, and that good times will again appear. There have been many changes, but not more than we could have expected during nearly a quarter of a century. We have fewer works, but their capacity for production, especially the blast furnaces of the kingdom, has largely increased. The iron trade has shifted from some localities to another.

AMERICAN IRON PRODUCTS IN CANADA.

An interesting review of the developments in Canadian iron production in 1894 is given in a paper read at the annual meeting of the General Mining Association of the Province of Quebec, at Montreal, Jan. 9, by Geo. E. Drummond, vice-president of the Association. Special interest attaches to the portions of the paper relating to the enlarged market in Canada for American iron products, in competition with those from England and Continental European countries. We headline as above, to emphasize this feature, though the paper for the most part deals with Canadian production:

Bar iron and manufactures of mild steel, such as plates, angles, etc., have remained practically unchanged during the year, but owing to the quiet state of trade prices, closed a few shillings lower than the opening figures of the year. The change that has come over the trade in these goods is very marked. A few years ago almost the entire requirements of the country in mild steel, and all the bar iron that was not produced in this country, came from Great Britain. During the year just ended the importations of these goods from Great Britain were practically nothing. Prices on the American side have been forced down, by keen competition, to such an extent that all the steel plates, and the great proportion of the angles and other shapes now come from Pittsburg, at prices which the English manufacturer cannot touch. * *

In sympathy with the condition of the iron trade elsewhere, the Canadian iron industry has felt the depression in some degree. The battle over the tariff question that was fought at Ottawa throughout the winter months, had the effect of retarding the progress of the industry, and it may be safely claimed that the first half of the year was, to a certain extent lost in uncertainty.

Happily the Dominion Government decided that the industry should be encouraged. This restored confidence, and the iron masters took up the work promptly. The effects, however, of the depression in the United States had a very marked effect on the trade of the last six months of 1894. The overstocks of the American iron furnaces were thrown into the Canadian market, and American pig iron found its way as far east as Montreal, at prices that, under ordinary circumstances, would be quite impossible, and that certainly did not return any profit to the American manufacturer. In many cases the bankrupt stocks held by American banks were thus unloaded, presenting a formidable competition to Canadian iron masters. Aside from this, the general depression affected the largest consumers in Canada, such as the railways, and the consumption fell short of the ordinary requirements.

Under the existing circumstances, and compared with the state of the trade in the United States, Great Britain, and elsewhere, the Canadian iron industry made very good progress in 1894, at least demonstrating that those now interested in the manufacture of iron have thrown themselves heartily into the work of development, even under most adverse circumstances

In Nova Scotia the New Glasgow Iron, Coal & Railway Co. have kept their furnace in full blast from the beginning of the year, and their record of output for 1894 compares most favorably with that of 1893. The record is as follows:

Coke used	39,521	net tons.
Coal "	2,857	" "
Ore "	60,817	" "
Lime "	22,928	" "
Iron produced	28,142	" " 1,600 lbs.

The affiliated company of New Glasgow have gone on steadily extending their operations in the steel department.

The Londonderry Co., who seek their principal market for pig iron in Ontario, have perhaps felt the American competition more keenly than the New Glasgow Co., but they have done comparatively well for the times.

The Pictou Charcoal Iron Co., at Bridgeville, were in operation for several months of the year, and, although closed down at the present moment, will show a fair output.

The same applies to the work at Drummondville in the Province of Quebec.

At Radnor Forges, the operations of the Canada Iron Furnace Co. in all branches will surpass the record of 1893. In the charcoal iron department the output is practically the same as last year.

In August last the company, after a continuous campaign of nearly two years, found it necessary to shut down for relining of the furnace, and the campaign for 1894 was from this, and similar causes, reduced to a period of a little over nine months. In this nine months the company produced of high class

Charcoal iron	7,178	net tons, 660 lbs.
Ore mined	15,866	" 1,033 "
Charcoal	663,269½	bushels.
Cordwood	23 363½	cords.

An average of some 650 men and 300 horses were employed throughout the year, in the field and at the works. The work of prospecting has been carried on vigorously as in the past, and the ore fields extended and perfected over a very large territory. The company have found competition very keen during the year, but the high quality of their iron has commanded a steady market for it. The auxiliary businesses in connection with the company have all shown progress, and the value of the industry to the Province, and especially to the farming community, has been more than ever demonstrated.

Aside from the difficulties experienced by Canadian iron masters in meeting the panic prices of their American rivals, another grave difficulty has recently arisen by the passage at Ottawa of an order-in-council, Nov. 2, 1894, entitled "Re drawbacks on import goods used in Canadian manufactured articles, and exported." This order-in-council was passed with a view of encouraging the exportation of agricultural implements to foreign markets. The principle of encouragement was perfectly correct, but the way in which the enactment is framed, and the manner in which it works, are most detrimental to the development of the Canadian iron industry in its broadest sense.

As it stands to-day it obliges Canadian consumers to use foreign raw material before they can avail themselves of the encouragement offered by the Government, and it bars out altogether the use of Canadian raw material. A striking illustration of this was given a few weeks ago, when a Western plow manufacturer wrote to one of the iron furnace companies, and said that much as he desired to use Canadian material at competitive prices with American, yet, inasmuch as he exported largely to Australia and Great Britain, he was compelled to use American iron and steel, so as to take advantage of rebates from the Dominion Government. Another Canadian manufacturer when absent from home recently, received a letter from his house reading somewhat as follows:

"We beg to advise having just received an order for plows for shipment to Australia. The shipment must be made by outgoing steamer, and we deeply regret that we have been compelled to use Canadian steel, as we have no American steel in stock, hence we must sacrifice the ordinary rebate."

It is quite evident that the manner in which the Dominion order-in-council was drawn up, and is now being acted upon, is merely an error, but it is one that should be rectified immediately, as it simply serves to nullify the protection and encouragement to the Canadian iron industry granted by the Dominion Government itself at the last session of Parliament. To be entirely consistent with their policy of encouraging the manufacture and use of Canadian iron made from Canadian ores, the Government should so frame the order-in council in question that manufacturers of agricultural implements be entitled to what the duty would have been had they imported the raw materials used in their machines, but leaving them entirely free to use Canadian raw materials; in other words, the encouragement should take the form of a bonus than an actual rebate of duties.

So long as the order-in-council remains as it is today, and the present condition of the American iron market exists, Ontario agricultural implement manufacturers will prefer to confine their purchases to American iron and steel, so that they will be relieved from the trouble and annoyance of locating specific importions of iron and steel necessary in making out papers calling for rebate of duties.

[In conclusion, the paper refers to the act passed by the government of Ontario, authorizing the payment to iron ore producers on all ores mined and smelted in the province for five years from July 1, 1894, the equivalent of $1 a ton on the pig metal products of such ore—this to a maximum amount of $25,000 a year. A coke furnace of large capacity is now being erected at Hamilton, Ont., by the Hamilton Iron & Steel Co., that will be in blast next summer and other furnaces are talked of. The paper suggests that Quebec take similar action and preserve its position as the largest producer of high-class charcoal iron in the Dominion.]

ROLLER BEARING SCREW JACK.

The Newark Machine Tool Works, of Newark, N. J., have built a new design of their screw jack, with roller bearing, which embodies all the improvements suggested by the years this tool has been in use. The load can be raised by either the foot or the head of the screw, as desired. The bevel gear nut is driven by the pinion and the ratchet handle, as shown very clearly in the cut. To lower rapidly the long handle is withdrawn from the ratchet, which then can make a full turn. The friction is reduced to the lowest amount by careful design and workmanship and by the use of hardened steel roller bearings to carry the load. The jack is practically unbreakable, being made throughout of steel or the best air furnace

malleable iron. It is designed for loads of 10 tons and under; stands two feet high and lifts 12 inches. Two sizes are built —one of $2\frac{3}{16}$ screw, weighing 100 pounds, and the other $1\frac{11}{16}$ screw, weighing 75 pounds.

Canadian Iron Pipe May Advance.

Prices on wrought iron pipe have not afforded much of a margin to makers in Canada for over a year and a half back. This condition of affairs was chiefly due to the abnormally low prices at which American pipe has been offered since the period of depression set in across the lines. American makers offered their pipe entirely irrespective of what it cost to manufacture it, and our Canadian makers had to follow suit. Recently, however, a change in the disposition of holders on this article in the States has been noted. In fact, makers there have withdrawn old discounts, and if the change is lasting, it is just possible that Canadian makers will follow suit. There are only one or two makers of iron pipe in Canada, the chief being in Montreal, and it would not be surprising if advantage was taken of the situation to secure a more profitable margin than the present basis affords. This week we repeat the old rate of discount, but it is possible that we may have to record a change before the date of next writing.—[Hardware, Toronto.

The American Steel Casting Co., of Thurlow, Pa., has just successfully cast a Spiller's patent ten-inch pneumatic depressing carriage, weighing 28,000 pounds and 17 feet 4 inches in diameter. By reason of its great diameter the casting is one of the most difficult to make. It was too large to ship to Cramp's shipyard by railroad, and was sent by boat. The casting will be used in the turret of one of the warships building at Cramps.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

Green Machinery Co., Knoxville, Tenn, will buy a second-hand hoisting engine, 80 to 100 h.p.

Bradford Bros., Clarksburg, W. V., are in the market for a boiler of about 50 h.p. and engine of 35 h.p.

The Warner Lock Co., 412 Manhattan Bldg., Chicago, want to buy a complete brass foundry outfit, in good order.

Charles Baur, Terre Haute, Ind., is in the market for a second-hand 80 to 100 horse power engine in good repair, preferably Ideal or Ball.

The American Champion Plaster Co., Richmond, Va., asks prices on machinery to pulverize limestone and to grind furnace slag to the size of beach slag.

The Withington & Cooley Mfg. Co., of Jackson, Mich., manufacturers of farm and garden tools, are about to contract for the construction of a steel truss roof.

The Everson Tube & Metal Co. has been incorporated at Pittsburg, by George H. Everson, M. H. Howell, Joseph H. Shinn, R. W. Richardson and John Owen.

The Interstate Iron Works have been incorporated at Meridian, Miss., by Ed. M. Ivens and others, with a capital stock of $250,000, for the manufacture of machinery.

The Holmes Steam Shovel Co. has been incorporated at Danville, Ill., with a capital stock of $50,000, by Robert Holmes, Frank Lindley, Frank Penwell, W. A. Marble and John Vreedenberg.

The time for opening the proposals for the iron stairs, vault doors, etc., for the U. S. post office and court house building at Charleston, S. C., is extended to 2 P. M., March 8, by the Supervising Architect, Washington, D. C.

The Bradley Filter Co. has been incorporated at Syracuse, N. Y., by C. C. Bradley, W. C. Bradley, and C. S. Bunnell, with a capital stock of $50,000, to do a general foundry, machine shop and steam fitting business in that city.

The Phillipsburg Iron Works have been incorporated at Phillipsburg, Mont., with a capital stock of $45,000, by Fred and William Bowen and E. R. Thompson, to carry on a general foundry and iron business at that place.

The Cook-Stoddard Mfg. Co., of Dayton, O., just incorporated with $30,000 capital, will manufacture gas engines under the patents of Hugo Cook, who is well known as the owner of National cash register patents. The directors of the company are: Hugo Cook, president; Harry Stoddard, vice president; R. S. Fowler, secretary and treasurer; W. S. Kinnard and Chas. Craighead. The company has secured a building and has purchased a part of its equipment. It will start with good prospects for business.

New Construction:—

The machine shops of the Chester & Lenoir Railroad are to be located at Lincolnton, N. C.

The Crucible Steel Casting Co., recently organized at Canton, O., with a capital stock of $10,000, will erect a plant at that place.

All of the material is on the grounds at Alexandria, Ind., for the new Union Steel Co.'s rail mill and Bessemer steel plant. The plant will employ 1,600 men before Nov. 1.

The Farrel Foundry & Machine Co., of Ansonia, Conn., have decided to build a new roll and machine shop. The building will be 104 ft. wide and 260 ft. long, constructed entirely of iron, brick and glass. The roof will be of copper.

At Frankton, Ind., 200 of the 250 lots that must be sold to insure the location of the new tin plate plant have been disposed of and the rest will be taken. Work will begin as soon as weather permits.

The erection of the National tin plate plant at Anderson, Ind., is being pushed. The main building is up and is 400 feet long. The engine rooms are also erected. The plant will be running May 1, with 400 men. It will be increased to working 700 by the first of the coming year, or the company forfeits the bonus of $20,000.

The Reading Iron Co., of Reading, Pa., has asked that city to vacate certain unopened streets so that the erection of the new rolling mill and puddling furnaces which it is proposed

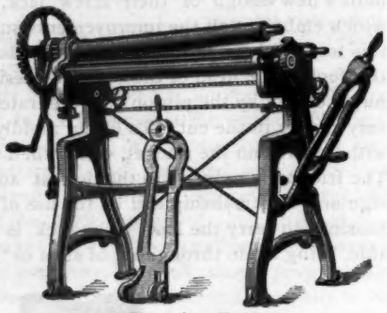
Machines for Working Sheet Metal.

Patent Gap Shears.

Patent Gap Shears, Especially designed for Squaring, Trimming and Slitting. 6 to 18 inch throat for Slitting Wide Sheets. Complete for Tin or Iron, to 14 gauge. Seven Styles of various lengths HAND AND POWER.

General Purpose Punch and Shear. Seven Sizes.

Rear Side.



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to build near the Keystone furnaces, belonging to the company, may be proceeded with. The rolling mill is to be 200x200 feet and the puddle mill 100x230 feet in size.

The Wilmot & Hobbs rolling mills at Bridgeport, Conn., which were burned last week will be rebuilt. The company will continue its cold-rolling work in its other factory. One hundred and fifty men were thrown out of work.

Additions, Enlargements, Removals, Etc.:—

Dover Furnace of the Penn Iron & Coal Co., Canal Dover, O., is being rebuilt, and the stack enlarged to 16½ by 75 feet. Operations will be resumed in May.

The contracts for the enlargement of the tin plate works will be let next month, and it is expected that work will be well under way in the early spring. The orders for the machinery have not yet been let, but the company has been in consultation with different engineering firms, and specifications are being prepared. The extension will be a lateral one, and will occupy the land adjacent to the present main building.—[New Castle (Pa.) Guardian.

The plant of the Murray Iron Works, at Burlington, Ia., is being enlarged. An iron and glass building 116 feet long, with a traveling crane of 30 feet span and 10 tons capacity, has been built at the machine shop, to be used as an erecting room and shipping depot. A railroad siding has been run into it, and the crane spans the track, enabling heavy machinery to be handled with ease. The boiler shop has also been enlarged, and is now 104 by 126 feet, under one roof. A tower 55 feet high has been bui't, to carry a ten-ton crane, which serves a Morgan hydraulic riveter having an over reach of 127 inches and a closing power of 50 tons on the rivet.

Fires and Accidents:—

At Utica, N. Y., Munson Bros.' foundry burned Feb. 5. Loss, $80,000. The Eureka Mower Co. lost $30,000.

At Parkersburg, W. Va., Logan & Co.'s carriage factory was burned Feb. 7 with a loss of between $8,000 and $10,000.

Fire destroyed the pattern shop of the Union Foundry & Machine Co., at Catasauqua, Pa., causing a loss of $15,000 to the building and contents. Insurance was about $9,000.

General Industrial Notes:—

Copake furnace, Columbia Co., N. Y., blew in on Feb. 5.

Pine Grove furnace, Cumberland Co., Pa., which was banked part of January, is now in blast.

One of the furnaces of the Appalachian Steel & Iron Co., at Big Stone Gap, Va., has been blown in.

The Sligo Furnace Co., of St. Louis, Mo., will blow out its furnaces Feb. 15 for an indefinite period.

Ivanhoe furnace, Wythe Co., Va., which was banked for two weeks in January, has been blown in again.

Mackintosh, Hempill & Co., of Pittsburg, are working on a large universal mill for the Bethlehem Iron Co.

The Findlay rolling mill at Muncie, Ind., is now running with a larger number of hands than at any time.

The furnace of the Leesport Iron Co., Leesport, Pa., has been blown out and will remain idle indefinitely.

It is reported that the American Steel Casting Co. is making preparations to start up its Sharon, Pa., plant.

Sharon Iron Co., Ltd., operating Sharon furnace, Sharon, Pa., reduced wages of blast furnace employes 10 cents per day.

The Vineland Iron Foundry, at Vineland, N. J., has been sold to Jas. L. Stewart, who will put the plant in repair and operate it.

The Indiana Bridge Works, Muncie, Ind., have been shut down for some weeks for repairs but resumed this week with half force.

The Elmira (N. Y.) Iron & Steel Co. rolling mills were shut down on account of scarcity of orders. It is expected that they will be started up again soon.

Andrews Bros. Co.'s furnace at Haselton, O., is reported to have banked down Feb. 11 owing to a short supply of coke. Repairs will be made before starting up.

The report that Mary Furnace at Lowellville, O., was out temporarily, was in error. There has been no interruption of operations and a good output has been made.

The Atlanta Steel & Tin Plate Co., of Atlanta, Ind., will

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UNION MINING CO.,

Proprietors of the CELEBRATED Mount Savage Fire Brick.

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HIGH GRADE FIRE BRICK for

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light its plant by electricity, and has under consideration a proposition for the lighting at the present time.

An order has been made in court at Toledo, O., directing that the Smead foundry be sold. It is estimated by Mr. Smead to be worth $150,000.

The Illinois Steel Co. is making preparations to start its open-hearth furnaces at the South Chicago works on the manufacture of basic steel.

The Kellogg Seamless Tube Co., of Findlay, O., has been reorganized under the name of the Kellogg Weldless Tube Co., and the plant will be put in condition for starting at once.

The Malty & Wallace Co., of Champaign, Ill., ran off its first heat in its new foundry on the 29th of January. The foundry is well equipped with all the latest appliances, including a Whiting cupola.

The mills about Youngstown, O., are running about as in the latter part of January—perhaps not on so full a scale. Lack of fuel, severe weather and other temporary causes have operated adversely.

At Dowagiac, Mich., the Round Oak Stove Co. closed its works Feb. 9. The 300 employes said they would strike unless the wage rate of 1894 were restored, and the company shut down at once.

The Atlantic Iron Co.'s mill at New Castle, Pa., has orders that will keep it running until April. The Arethusa also will be kept in steady operation through the winter. The wire nail works, steel plant and rod mill are all well supplied with work.

The Clonbrock Steam Boiler Co. has filed articles of incorporation in New York. The capital stock is $200,000 in shares of $100. The incorporators are Thomas F. Morrin, Thomas J. Lawler, Mathew B. Morrin and John Harlin, Brooklyn. The company will carry on operations in Brooklyn.

It is reported that a movement is on foot to start a new company at Bucyrus, O., to organize a local stock company to take the old plant of the Bucyrus Steam Shovel & Dredge Co., of that place, and run it for the manufacture of steam shovels and dredges. It is likely that the new company will have a capital stock of $100,000.

At the American Tin Plate Works, Elwood, Ind., four new mills have started and 200 extra men went to work. There are now nine mills in operation employing 750 men. The plant has grown from five mills in 1892, employing 300 men. It now turns out 7,500 boxes of finished plate per week, and has nine mills in operation and a tenth under construction.

At Pittsburg, in United States Court, argument is in progress in the case of the Oliver & Roberts Wire Co. against the Pittsburg Wire Co. The plaintiff alleges in a bill in equity that the defendants infringed on a patent rod mill, and asks for an injunction to restrain the Pittsburg Wire Co. from using it. The action was commenced in 1892, and a great mass of testimony has been taken before a commissioner.

The Elwell Parker Electric Co. of America, is now building for the Cleveland City Railway Co. a 1,000-h. p. direct connected generator for running street cars that is to be driven by a triple expansion condensing engine of the marine type, manufactured and supplied by the Globe Iron Works, of Cleveland. The speed of the generator and engine is to be 110 revolutions a minute. This machine is designed to work at an efficiency as high as anything heretofore obtained, if not higher. The maximum overload capacity is to be 2,000 h. p.

A Wheeling dispatch of Feb. 9 says: The Riverside Co. has its steel works, two blast furnaces, skelp mill and bar mill at work. The Bellaire Co. has its plant on full, including the new blast furnace. The Aetna-Standard is on full, except four sheet mills, which are being changed to tinned plate mills, giving employment to 1,500 men. The La Belle is making rapid progress with its tin plate mill, and will be ready for operation by the 1st of April. The Whitaker Iron Co. is in full operation, employing 500 men.

The month of January was a very good one for Warren Webster & Co., of Camden, N. J., several very large contracts being booked. The company furnishes Webster vacuum feed water heaters and purifiers in some cases with the stipulation that it receives its pay in monthly savings in fuel until invoices are paid in full. Among such were the following: Glen Mfg. Co., Berlin, N.H.; Messrs. Sayles & Jenks, Warren, Mass.; Messrs. F. R. Walker & Son, Burnside, Conn; Beaver Tin Plate Co., New Lisbon, O.; the Johnson Co., Lorain, O.; Hurlbut Paper Mfg. Co., South Lee, Mass.; estate of C. H. McCormick, Chicago; M. Guggenheim's Sons, New York; Midvale Steel Co., Nicetown, Pennsylvania; J. H. Horne & Sons Co., Lawrence, Mass.

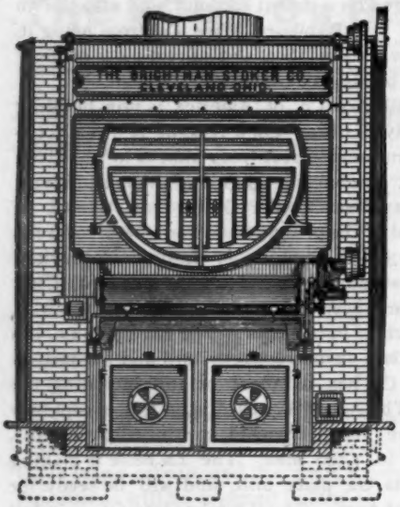
The Low Moor Iron Co. expect to blow in its C furnace at Covington, Va, shortly. The manager, Mr. H. G. Murry, says the company regards the iron outlook as quite favorable. It is now employing over 1,200 men at the mines and furnaces. Two ore washers are being erected at the Dolly Ann mines, and the output will be increased to 500 tons per day. A and B furnaces, each of 125 tons capacity per day, are situated at Low Moor. One of these is held in reserve, while the other is in blast. The C furnace is a duplicate of the other two. The company has 150 berburn coke ovens, but the Covington furnace will purchase its coke supply from New River. Foundry and

machine shops are located at Low Moor, where all repairs are made. It quarries its own limestone, mines and washes its own ores, makes its own coke and has its own machine and repair shops. Other improvements are now in progress, among which is an electric lighting plant (Westinghouse system). It is not unlikely in the near future that this electric plant will be extended for tramming and other power purposes.—[Engineering and Mining Journal.

Among the $160,000 worth of contracts on hand at the Bucyrus Steam Shovel & Dredge Co.'s works at South Milwaukee when the receivers were appointed is one of $86,000 with the Government. The receivers, John S. George and Howard P. Eells emphasize the fact that the business of the company will proceed without interruption. Existing contracts will be executed and orders for new machinery, repairs, supplies, etc., will be taken on behalf of the receivers and promptly executed. The company's products have always been in favor, and under the energetic business and engineering management that is to continue through the receivership, there is good prospect that the affairs of the company will work out satisfactorily to creditors and stockholders.

The Chicago Wire & Spring Co. filed a bill last week in the circuit court at Chicago, to obtain a settlement with the Northwestern National Bank, William F. Dummer, Franklin H. Head and Harry F. Southwell. The company operated a wire mill at Lockport, Ill., claimed to be worth $100,000. Being in difficulties in 1890, it borrowed $10,000 from Head and $15,000 from Southwell, both amounts being secured by trust deed. The next year it made an agreement with B. F. Jacobs & Co. to erect a big mill at Wireton, Cook county, Jacobs & Co. agreeing on their part to convey land to the company. Carnegie, Phipps & Co. demanded an account of $15,000 and Head and Southwell advanced the money, taking a mortgage on the residence of the company's president, Millard R. Powers, in Evanston. The Lockport mill was destroyed by fire and the company was compelled to give a trust deed to Head for the Wireton Park property. It then made an agreement to place the property in Southwell's hands, he agreeing to expend $50,000 in completing the mill and operating it. It is claimed he abandoned all work after he had expended $21,000. The company claims to be entitled to its share of the profits that would have been made if the mill had been operated.

While the grindstone still remains a popular and useful accessory in the manufacture of articles of iron and steel, the mechanical public was quick to see the value of an artificial wheel whose emery grains were harder and sharper than those of natural and sometimes rounded sand. The solid emery wheel, therefore, soon made its way into public favor. Early attempts to introduce a similar material and process as applied to the production of honestones, oilstones and whetstones, seemed not to be successful. The peculiar properties of Tanite, which fit it for a base in emery wheel manufacture, have been applied by the Tanite Co., of Stroudsburg, Pa., to the production of solid emery whetstones. The result has been a practical success, though the prejudice of the trade and the novelty of the article have conspired to make the demand irregular and scattering. That this is not due to the quality of the artificial whetstone is evidenced by the fact that in quarters where it has been introduced the demand is regular. The Tanite whetstone is adapted to the mill pick, the carpenter's and stone cutter's chisel, the bit, the axe and to many other tools specially subject to wear. The Tanite Co.'s other products have proved their perfect adaptation to grinding uses.



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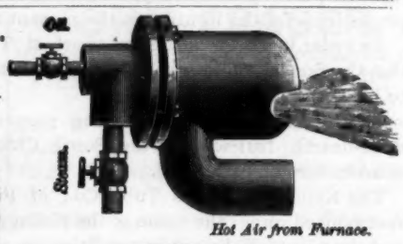

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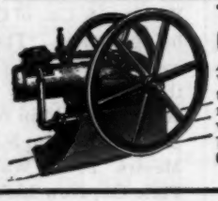

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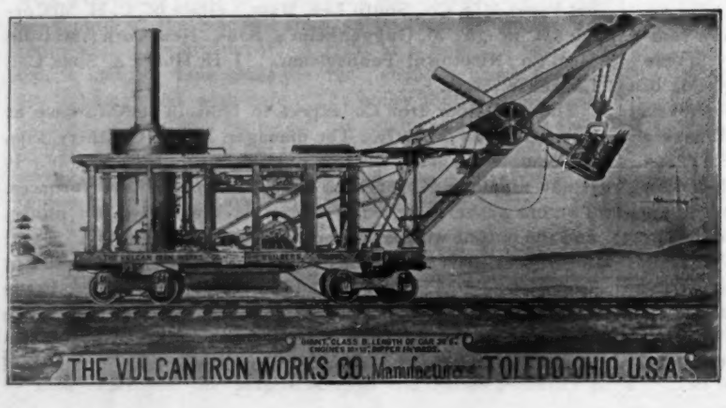

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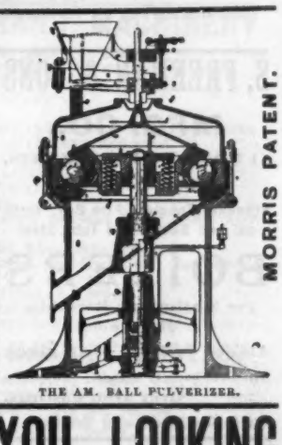

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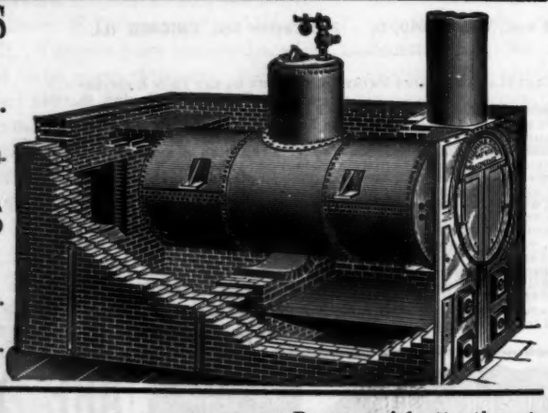

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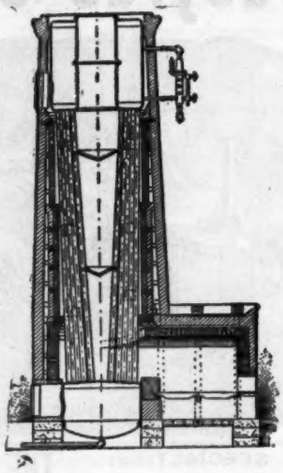

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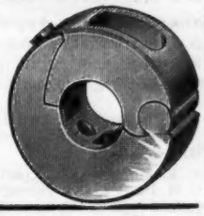

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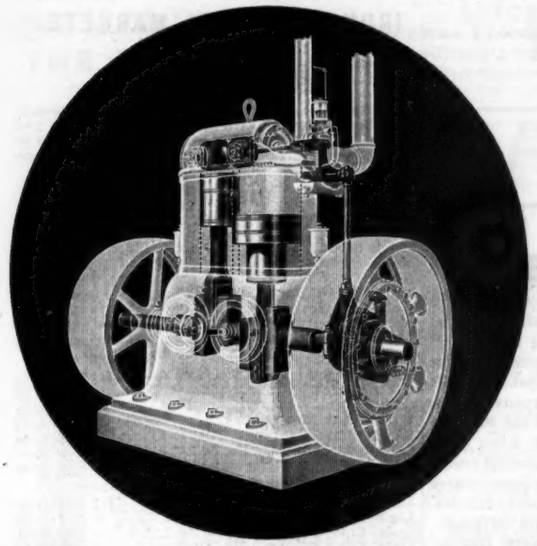

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Hematites No. 1 non-Bessemer	2.00@ 2.50
No 1. Specular, non-Bessemer	2.35@ 3.00

PIG IRON.

CLEVELAND (f. o. b. cars):	
Bessemer	$10 00@$10 25
No. 1 Strong Foundry	11 00@ 11 25
No. 2 Strong Foundry	10 00@ 10 25
No. 1 Gray Forge, red short	9 10@ 9 25
No. 2 Gray Forge, neutral	9 00@ 00 00
No. 1 American Scotch	11 25@ 00 00
No. 2 American Scotch	10.25@ 00 00
Lake Superior Charcoal	12 50@ 13 00
PITTSBURG:	
No. 1 Foundry	$11 25@$11 75
No. 2 Foundry	10 25@ 10 75
Gray Forge	9 50@ 9 75
White and Mottled	9 00@ 9 25
Warm Blast Charcoal	18 00@ 19 00
Cold Blast Charcoal	22 00@ 26 00
Bessemer	10 65@ 00 00
CHICAGO (reported by our representative:)	
Lake Superior Charcoal	$13 00@$13 50
Local Coke Foundry No. 1	10 25@ 10 50
Local Coke Foundry No. 2	9 75@ 10 00
Local Coke Foundry No. 3	9 40@ 9 65
Local Scotch Foundry No. 1	10 25@ 10 50
Local Scotch Foundry No. 2	9 75@ 10 00
Local Scotch Foundry No. 3	9 50@ 9 75
Southern Coke No. 1	11 00@ 11 25
Southern Coke No. 2	10 00@ 10 50
Southern Coke No. 3	9 75@ 10 25
Southern No. 1 Soft	10 25@ 10 50
Southern No. 2 Soft	10 00@ 10 25
Southern Silveries No. 1	11 50@ 11 75
Southern Silveries No. 2	11 25@ 11 50
Jackson Co Silveries	15 50@ 16 00
Ohio Silveries No. 1	14 00@ 14 50
Ohio Silveries No. 2	13 00@ 13 50
Ohio Strong Softeners	12 50@ 13 00
Alabama Car Wheel	17 50@ 18 00
Malleable Bessemer	11 00@ 11 50
Coke Bessemer	11 00@ 11 50
CINCINNATI (reported by Rogers, Brown & Co.)	
Southern Coke No. 1, Foundry	$ 9 75@$10 50
Southern Coke No. 2 and No 1 Soft	9 25@ 9 50
Hanging Rock Coke, No 1	12 00@ 12 00
Hanging Rock Charcoal No. 1, Fdy	16 00@ 17 50
Tennessee Charcoal No 1	14 00@ 14 50
Jackson County Stone Coal No 1	14 50@ 15 00
Southern Coke, Gray Forge	8 50@ 8 00
" " Mottled	8 25@ 8 75
Standard Alabama Car Wheel	15 75@ 16 50
Tennessee " "	15 50@ 16 75
Lake Superior " "	14 00@ 14 00
BUFFALO (reported by Rogers, Brown & Co.)	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	$11 00
No. 2 Foundry Strong Coke Iron Lake Superior Ore	10 50
Ohio Strong Softener No. 1	11 10
Jackson Co. Silvery No. 1	15 50
Lake Superior Charcoal	13 75
Southern Soft No. 1	11 00
Hanging Rock Charcoal	18 50
ST. LOUIS (reported by Rogers, Brown & Meacham):	
Southern Coke No 1	$10 25@$10 50
Southern Coke No. 2	9 75@ 10 00
Southern Coke No. 3	9 25@ 9 50
Southern Gray Forge	9 00@ 9 25
Southern Charcoal No. 1	14 00@ 14 50
Missouri Charcoal No. 1	12 50@ 13 00
Ohio Softeners	14 00@ 14 50
Lake Superior Car Wheel	15 50@ 16 00
Southern Car Wheel	16 00@ 16 50
Connellsville Coke, St Louis	4 40

OLD RAILS AND SCRAP METAL.

[Prices paid by mills.]

	GROSS TONS
Old iron rails	$12 50
Old steel rails	10 00
	NET TONS
No. 1 R. R wrought scrap	$ 9 00
No. 1 wrought scrap	8 00
No. 1 Machine cast scrap	8 00
Iron axles	14 50
Axle turnings	7 50
Wrought turnings (free from cast)	6 50
Cast borings	5 50
Uncut wrought iron boilers	4 00
Steel boiler plates	8 00
Grate bars	5 50
Pipes and flues (clean)	7 00
Tank iron	7 50
Hoop and band iron	6 00
Sheet iron	5 50
Wrought drillings	6 50
Malleable iron	8 00

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. mill)	1.25c@1.35c
Angles	1.20c@1.25c
Tees	1.35c@1.45c
Universal Plates	1.20c
Sheared Plates	1.30c

MERCHANT IRON AND STEEL.

[List prices out of store.]

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 30
1¼ to 6 by ⅜ to 1 inch	1 35
1¼ to 6 by 1¼ to 2 inch	1 50
1¼ & 1⅜ by ⅜ to ¾ inch	1 35
1 & 1¼ by ⅜ to ¾ inch	1 40
⅝, ¾, ⅞, by ⅜ to ⅝ inch	1 50

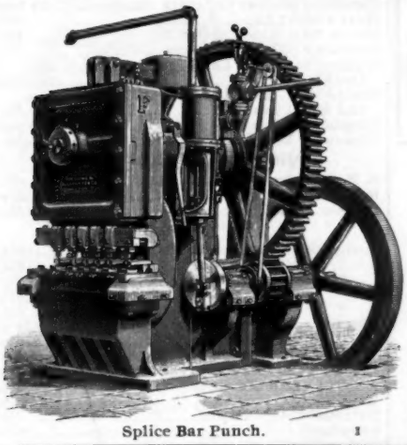
Frank P. Cady, Pres. and Supt.
Geo. H. Bowler, Sec'y and Treas.

THE CADY MFG. CO.

283 W. River St., CLEVELAND, O.

AUTOMATIC MACHINERY.
Power Presses, Dies, Drop Hammers, Punches and Shears, Wire Straighteners and Cutters, Wire Forming Machines
SEND FOR CATALOGUE.

PERFORATED METALS
OF ALL KINDS FOR
MILLING MINING AND AGRICULTURAL MACHINERY,
PERFORATED IRON, STEEL, COPPER, BRASS, TIN, ZINC, LEAD, ETC., TO ORDER.
LARGE AND VARIED ASSORTMENT OF SIZES. CORRESPONDENCE SOLICITED.
THE ROBERT AITCHISON. PERFORATED METAL CO.,
OFFICE, ROOM 510 265 TO 269 DEARBORN STREET, CHICAGO, ILL. WORKS SOUTH CHICAGO.



Splice Bar Punch. 1

—THE—
Long & Allstatter Co.
HAMILTON, O., U. S. A.

Manufacturers of Belt, Steam and Electrically driven
POWER PUNCHES and SHEARS,
for all kinds of Boiler, Tank and Structural Iron Work, Rolling Mills, Locomotive Shops, Car and Wagon Shops, Plow Shops, etc. Send for Catalogue.

...H. LEITCH, PRES JOHN C. LEITCH, SEC. AND GENL. MAN. JOHN A. WILSON, TREAS.

WESTMORELAND FIRE BRICK CO.
MANUFACTURERS OF HIGH GRADE **FIRE BRICKS.**
PITTSBURG, PA.
Works and Mines, Westmoreland, Pa

DIXON'S GRAPHITE PAINT
FOR TIN OR SHINGLE ROOFS AND IRON WORK. IT IS ABSOLUTELY WITHOUT AN EQUAL.
Tin roofs well painted have not required repainting for 10 to 15 years.
If you need any paint it will pay you to send for circular.
JOSEPH DIXON CRUCIBLE CO., Jersey City, N. J.

IRON CLAD PAINT CO.
Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g.
CLEVELAND, OHIO.

Trade Mark Patented.

ORDER DIRECT FROM THE
Iron Clad Paint Co.
And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.
IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.
FURNISHED both Dry and Ground in Oil
USED BY NEARLY ALL THE RAILROADS.

Round and Square.

1 to 1⅞ inch	1 30
2 to 2⅞ inch	1 40
2¾ to 3¼ inch	1 55
3⅜ to 4 inch	1 80
4¼ to 4½ inch	2 40
4¾ to 5 inch	2 60

Oval.

⅜ to 1¼ inch	1 50
⅜ to ¾ inch	1 50
½	1 70
⅝	1 90

Half Oval and Half Round.

1¼ to 3 inch	1 85
⅜ to 1⅞ inch	1 65
⅜ to ¾ inch	1 90
½	2 05
⅝	3 15

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 40
1 to 1¾ by ¼ and 5-16 inch	1 45
¾ to ⅞ by ¼ and 5-16 inch	1 55
½ to ⅝ by ¼ and 5-16 inch	1 80

Hoop Iron.

1 7-16 to 4, No. 13, 14, 15 and 16	1 85
1 7-16 to 2, No. 17, 18 and 19	1 90
1 7-16 to 2, No. 20	2 00
1 7-16 to 2, No. 21	2 10
1 7-16 to 2, No. 22	2 20
1⅛ to 1⅜, No. 13, 14 and 15	1 90
1⅛ to 1⅜, No. 16, 17 and 18	1 95
1⅛ to 1⅜, No 19 and 20	2 00
1⅛ to 1⅜, No. 21	2 10
1⅛ to 1⅜, No. 22	2 20
15-16 and 1 inch, No. 13, 14 and 15	1 85
15-16 and 1 inch, No. 16, 17 and 18	2 00
15-16 and 1 inch, No. 19 and 20	2 10
15-16 and 1 inch, No. 21	2 20
15-16 and 1 inch, No. 22	2 30
⅞, No. 13, 14 and 15	2 10
⅞, No. 16, 17 and 18	2 20
⅞, No. 19 and 20	2 30
⅞, No. 21	2 40
⅞, No. 22	2 50
13-16, No. 13, 14 and 15	2 20
13-16, No. 16, 17 and 18	2 30
13-16, No. 19 and 20	2 40
13-16, No. 21	2 50
13-16, No. 22	2 60
¾, No. 13, 14 and 15	2 30
¾, No. 16, 17 and 18	2 45
¾, No. 19 and 20	2 55
¾, No. 21	2 65
¾, No. 22	2 75
11-16, No. 13, 14 and 15	2 55
11-16, No. 16, 17 and 18	2 60
11-16, No. 19 and 20	2 70
11-16, No. 21	2 80
11-16, No. 22	2 90
11-16, No. 23	3 00
⅝, No. 13, 14 and 15	2 60
⅝, No. 16, 17 and 18	2 70
⅝, No. 19 and 20	2 80
⅝, No. 21	2 90
⅝, No. 22	3 00
⅝, No. 23	3 10
9-16, No. 13, 14 and 15	2 80
9-16, No. 16, 17 and 18	2 90
9-16, No. and 20	3 00
9-16, No. 21	3 10
9-16, No. 22	3 20
9-16, No. 23	3 30
7-16 and ½ inch, No. 13, 14 and 15	3 00
7-16 and ½ inch, No. 16, 17 and 18	3 10
7-16 and ½ inch, No. 19 and 20	3 20
7-16 and ½ inch, No. 21	3 30
7-16 and ½ inch, No. 22	3 40
7-16 and ½ inch, No. 23	3 50
⅜, No. 13, 14 and 15	3 50
⅜, No. 16, 17 and 18	3 60
⅜, No. 19 and 20	3 70
⅜, No. 21	4 00
⅜, No. 22	4 10
⅜, No. 23	4 25

Light Band.

1½ to 6 by ¼ to 3-16 inch	1 60
1½ to 6 by Nos. 11 and 12	1 65
1 to 1¾ by ¼ to 3-16 inch	1 65
1 to 1¾ by Nos. 11 and 12	1 70
⅞ and 13-16 by ¼ to 3-16 inch	1 80
⅞ and 13-16 by Nos. 11 and 12	1 85
¾ and 11-16 by ¼ to 3-16 inch	1 90
¾ and 11-16 by Nos. 11 and 12	1 95
⅝ and 9-16 by ¼ to 3-16 inch	2 05
⅝ and 9-16 by Nos. 11 and 12	2 10
½ by ¾ to 3-16 inch	2 20
½ by Nos. 11 and 12	2 25

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	1 80
⅞ inch, " " " " 13 and 14	1 90
¾ inch, " " " " 11 and 12	1 95
¾ inch, " " " " 13 and 14	2 15

Sheet Iron.

No. 10	1 85
No. 12	1 90
No. 14	1 95
No. 15-17	2 05
No. 18	2 20
No. 20	2 30
No. 22-24	2 40
No. 25-26	2 50
No 27	2 60

Steel Boiler Plates—1-4 in. and Heavier.

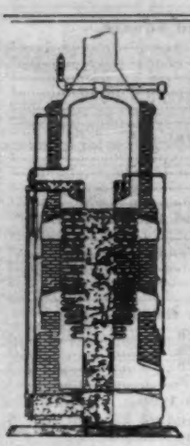
Tank	1 60
Shell	1 85
Flange	2 10
Marine Flange	2 35
Fire Box	3 35

Above includes plates 90 inches wide.

90 to 96 in. wide	¼c. lb. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1¼c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs.
1 to 2 in, inclusive	08
9-16 to ⅞ in. "	08½



THE ADAMS
WATER TUBE BOILER.

This Boiler is absolutely safe from explosion. Gives as much steam from the waste heat as any boiler made. Easy of access for cleaning and repairs. Furnishes perfectly dry steam. Occupies little ground space. Economical in first cost. Send for complete circulars giving list of users and testimonials, one of which is printed below.

The Falcon Tin Plate & Sheet Co., }
NILES, O., Aug. 18, 1893. }

Chas. P. Adams, Esq.

Dear Sir: The three boilers of 225 H. P. each which you furnished us are working in every way satisfactory. We consider them as good steamers as any we have ever used. Up to the present time have spent nothing on them for repairs. Very respectfully,

THE FALCON TIN PLATE & SHEET CO.,
By Warner Arms, Pres't.

C. P. ADAMS.
807 The Cuyahoga, - CLEVELAND. O.

C. W. HUNT COMPANY,
45 Broadway, New York,

THE HUNT TIP CAR.

MANUFACTURERS OF
HOISTING AND CONVEYING MACHINERY

For moving all kinds of material in Steam Power Stations, Factories, Gas Works, Mines, Coal Yards, etc.

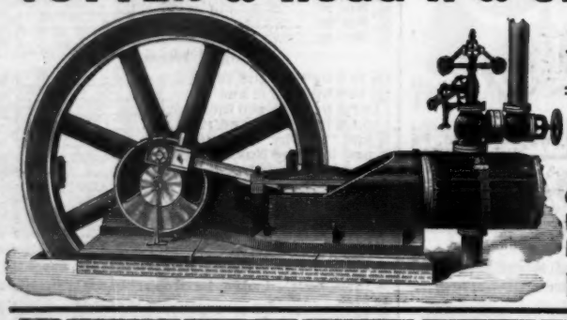
Tip Cars, Wire Rope, Barrows.
INDUSTRIAL RAILWAYS.

LEVER THROTTLE VALVES

"Lunkenheimer's" is admirably adapted for Traction, Hoisting and Yacht Engines, Steam Shovels, Saw Mills, Pile Drivers, Steam Hammers, etc. Adopted and endorsed by Engine Builders throughout the United States. Warranted and satisfaction guaranteed. **Specify** and **insist** upon "Lunkenheimer's." None genuine without our name. Our new Catalogue of superior steam specialties, "up to date," gratis upon request. Consult dealer.

THE LUNKENHEIMER COMPANY
FACTORIES, CINCINNATI, O.
NEW YORK STORE, 61 JOHN ST.
EUROPEAN STORE, THE LUNKEN VALVE CO 35 ST DOVER ST LONDON S.E.

TOTTEN & HOGG I. & S. F'DRY CO.



Manufacturers of
The "Ætna" Rolling Mill ENGINE,

Chilled and Sand Rolls and Rolling Mill Machinery.
Pittsburg, Pa.

For 22 Long and Successful years we have made our

"O.K." CROWN

OUR PRICES ARE JUST RIGHT

High Grade Fire Brick, in all shapes and sizes. They have stood the **TEST** with eminent satisfaction to our many customers, because they are made entirely on **HONOR.**

OAK HILL FIRE BRICK AND COAL CO. Manufacturers
OAK HILL, OHIO

Subscribe for the Iron Trade Review, $3 per year.

7-16 to ⅜ and 2⅜ to 3 in.	.09
3⅛ to 4 in.	.09½
⅜ to 11-16 and 4½	.10
⅝ to 6 in.	.10¼
¼ to 9-32 and 6⅛ to 7 in.	.11
16 in	.13

Flats.

	cts. lbs.
2 to 9-16 in. wide by 2 to ⅝ thick	.8

Bessemer and O. H. Steel.

Machinery	base price,	1 80
Tire	"	1 85
Spring	"	2 20
Sleigh Shoe	"	2 20
Toe Calk	"	2 05
Cutter Shoes, tapered and bent	"	2 45

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	3 70
Bridge ½, ⅝, 11-16 and ¾ inch diam.	3 40

MACHINERY SUPPLY MARKET.

Anvils.

American	₩ lb 9@10
Wright's	₩ lb 12

Bellows.

Blacksmiths'	Hill's	dis 40
	Bullock's	dis 50&10
Moulders'		dis 40@40&10
Hand		dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single,	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis 45

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.,	dis 35
Buffalo	dis 40

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis 35
Horton's Universal	dis40
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

Cast Steel	₩ 3½
Iron, steel points	₩ lb 3

Drill and Drill Sockets.

Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1½"	dis 50&10
Morse Taper and Straight Shank Larger than 1½"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

Emery.

	No. 4 to No. 54 46 gr.	150 gr.	Flour, C. F F. FF.
Kegs, ₩ lb	4½c	5 c	2½c
½ kegs ₩ lb	4¾c	5¼c	2¾c
¼ kegs ₩ lb	5 c	5½c	3 c
10 lb cans, 10 in case	6 c	6½c	5 c
10 lb cans less than 10	10 c	10 c	7½c

Emery Cloth and Paper.

Barder, Adamson & Co.	dis 50@50&5
H. H. Barton	dis 50@50&5

Emery Wheels.

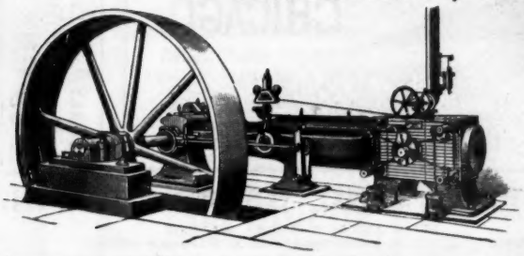
Detroit	dis 60@70
Norton's	dis 60@70
Grant	dis 60@70
Sterling	dis 60@70
Celluloid	dis 10&33⅓
Northampton	dis 55
Crystal	dis 65@70
Vitrified	dis 60@70
Vulcanite	dis 60&10
Hamden	dis 60&10@70
Cyclone	dis 60@60&10

Files.

Arcade	dis 60&10@60&10&10
Nicholson	dis 60&10@60&10&10
" X. F	dis 25
Kearney & Foot	dis 60&10@60&10&10
Black Diamond	dis 60&10@60&10&10
McClellan	dis 60&10@60&10&10
Disston's	dis 65@70

THE LANE & BODLEY CO.,

CINCINNATI, OHIO.



Engines.

ALL SIZES.

Simple and Compound.

Shafting, Hangers, Pulleys.

Belt Elevators, Saw Mills.

Have You Any Sand?

On your castings that you want emoved?

If so,

Will clean them better than any other method.

Try It.

Chicago Chemical Solution Mfg. Co.

41 Lakeside Bldg., CHICAGO, ILL.

Cleveland Union Station.

Pennsylvania Lines.

Foot of Bank Street.

TICKET OFFICES at Station, Euclid Av., Woodland Av., and Weddell House corner.

THROUGH TRAINS RUN AS FOLLOWS BY CENTRAL TIME
* Daily. † Daily, except Sunday.

FROM CLEVELAND TO	LEAVE	ARRIVE
Pittsburgh and Bellaire	† 7:00 am	†12:10 pm
Salem and Pittsburg	* 8:00 am	* 8:30 pm
Pittsburgh, Bellaire and East	†12:45 pm	† 6:25 pm
Philadelphia and New York	* 1:40 pm	*11:25 am
Baltimore and Washington	* 1:40 pm	*11:25 am
Alliance and Pittsburgh	* 1:40 pm	*11:25 am
Ravenna and Alliance	† 3:25 pm	† 9:50 am
Hudson and Ravenna	* 5:00 pm	* 8:25 am
Philadelphia and New York	*11:10 pm	* 5:25 am
Baltimore and Washington	*11:10 pm	* 5:25 am
Alliance and Pittsburgh	*11:10 pm	* 5:25 am

Mt. Vernon and Pan-Handle Route

FROM CLEVELAND TO	LEAVE	ARRIVE
Xenia and Cincinnati	* 8:40 am	* 5:15 pm
Akron and Columbus	* 8:40 am	*5:15 pm
Akron, Columbus & Zanesville	†2:45 pm	*12:10 pm
Akron and Orrville	† 3:25 pm	† 9.50 am
Columbus and Cincinnati	* 8:00 pm	* 6:55 am

Saturdays the 8:00 pm train will leave at 11:20 pm.

Valley Ry.

Depot foot of So. Water St.
City Office 137 Superior St.

	Arrive.	Depart.
Akron & Canton	*6:30 P M	*7:10 A M
Akron, Canton & Valley Jctn.	*10:10 A M	*3:15 P M
Valley Jctn. & Way Stations	†6:30 P M	†7:10 A M
Akron, Canton & Chicago	*8:00 A M	*6:30 P M
Wooster and Chicago	†2:45 P M	†11:00 A M
Wooster		*6:30 P M
Akron, Canton & Marietta	†2:45 P M	†11:00 A M
Steubenville, Wheeling, Washington, D. C., and Baltimore	†2:45 P M	†11:00 A M

†Daily except Sunday. *Daily. Pullman's Palace Vestibule Drawing Room cars between Cleveland and Chicago.

Bolt and Nut Works.

THE UPSON NUT CO., Manufacturers of Nuts, Washers, Carriage, Machine, Plow and Elevator Bolts, Coach Screws, etc.

CHICAGO HEIGHTS

The Industrial Centre of Chicago

offers **Free Factory Sites** and other inducements.

If you are seeking a new location it will pay you well to investigate the merits of our proposition.

Chicago Heights Land Association

M. H. KILGALLEN, Gen'l Mgr. CHICAGO

IN THIRTY YEARS

prices on **good** new, and second-hand, metal working machinery have **never** been as **low** as to-day.

The bottom mark has been reached.

Nearly all the good second-hand **machinery** on the market has been **sold out.**

Stocks of new machinery are **running down** very fast.

One month more will clean everybody out.

Then prices on everything will **advance.**

If **you** need anything, and want it at present low prices, better write for our list **to-day.**

Besides our stock of new machinery, we have on hand a few first-class machines, **slightly shopworn** and also a few fine **second-hand** tools, "as good as new." Prices **very low.**

HILL, CLARKE & CO.,

Machinery Merchants,

156 Oliver St., 12 and 14 N. Canal St.,

BOSTON. CHICAGO.

Subscribe for The Iron Trade Review. $3 a year.

Steel Stamps and Stencils.

FLEHARTY, J. H. & Co., Rubber Stamps, Seals, Stencils, Automatic Check Punches and Numbering Machines. 92 Seneca St.

Western	dis 70
Stub's	dis 25
Grobet's	dis 30
Reynolds Bros.' Hand Cut	dis 50
Industry File Works Hand Cut	dis 50

Hammers.

P. S. W	dis 40
Atha new list, Jan. 15, 1887	dis 50
Heavy hammers and sledges under 5 lbs	12c
" " " over 5 lbs	10c

Jack Screws.

Illinois Bolt Co. list	dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¾	4	3⅜	3⅛
Hexagon	15½	11¼	8½	6	5¼	5¼	
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ⅓ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

List July 14, 1887	dis 85
Standard Penny Nails, ⅓ keg card rate	
Car lots	$1.10
Less than car lots	$1.25

Oilers.

Zinc and Tin	dis 60
Brass and Copper	dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ⅓ doz	dis 10@10&10

Packing, Steam.

Boston Belting Co.	dis 60
American Packing Hemp	⅓ lb 9@10
Russia " "	⅓ lb 14
Italian " "	⅓ lb 13@19
Plumbago Piston	⅓ lb 40
Peerless	⅓ lb 60
Morrison's "	⅓ lb 45
Square Flax "	⅓ lb 50
Sheet Rubber	⅓ lb 12&24
Excelsior Rubber	⅓ lb 48
Rainbow, Full Rolls	45c ⅓ lb
Rainbow, Less than Full Rolls	50c ⅓ lb
Eclipse Gasket	⅓ lb 75

Picks.

Railroads, 5 to 6 lbs	$12 dis 60
" 6 to 7 lbs	$13 dis 60

Pulleys.

Iron Pulleys, Walker List	dis 50
Medart Pulleys	dis 50
Split Wood Pulleys	dis 55@60

Rivets.

Iron, Thousand, list November 17, 1887	dis 50&10@60
Iron, Ordinary, Cooper's Block and Carriage list November 17, 1887	dis 50&10@60
Copper	dis 50@50&10

Saws.

Disston's Circular	dis 40&10
" Band	dis 25
" Scroll	Net
Hack Saw Stubs	dis 20
" " Eureka	dis 20
" " Star	dis 20
Saw Swages Diston's	dis 30
Atkins' Circular Saws	dis 40&45
" Mill, Mulay and Drag Saws	dis 40&10
" Wood Saws	dis 40&10
" Silver Steel Diamond Cross-cut Saws	70c per ft
" Dexter Cross-cuts	50c "
" Diamond "	30c "
" Tuttle Tooth Cross-cuts	25c "
" One-man Cross-cuts	32c "
No. 1 Handles	23c per pair
No. 6 "	16c "
Excelsior Saw Tools	$6 per doz
Derfection "	$15 "
Petroit Saw Works, Circular	dis 50
" " " Band	dis 25
" " " Mulay	dis 45

Taps.

Cards, Hand and Nut to 2 in	dis 50
Carpenters' " " "	dis 50
Morse " " "	dis 50
Pratt & Whitney " " new list	dis 10
Machine Screw Taps	dis 55
Pipe Taps to 2½ in	dis 70
Stay Bolt Taps	dis 25
Stove Bolt Taps	dis 55
Pulley Taps	dis 40

Vises.

Solid Box	dis 60
Parker's	dis 20@25
Prentiss	dis 20
Stephen's	dis 25@30
Barrett's	dis 30
Miller's Falls	dis 40
Merrill's	dis 15@20
Howard	dis 35

Wire.

New List, Apr. 9, 1894

Brass	dis 40
Copper	dis 40
Bright and annealed, Nos 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis65&
Tinned market Nos. 0 to 18	dis 57½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
Annealed Fence, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 10 to 14	dis 75
Stub's Steel Wire regular	95c ⅓ lb dis 30

Wrenches.

Coe's genuine	dis 50
Girard Standard	dis 70&10
Agricultural	dis 75&10
Mechanic's	dis 55&10& 5
Bemis & Call's Combination	dis 35
Donohue's Engineers	dis 20&10
Lamson & Sessions Engineers	dis 60
Billings & Spencer's Drop Forged	dis 25
William's " "	dis 25
Alligator " "	dis 40

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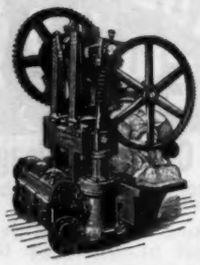

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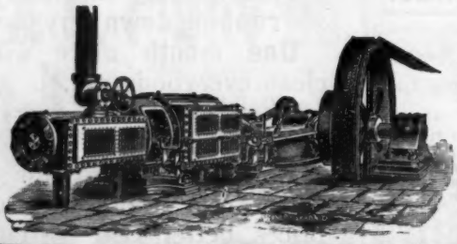

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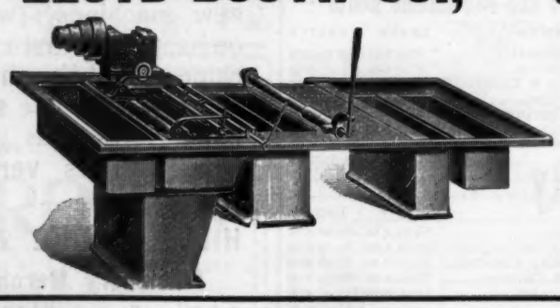

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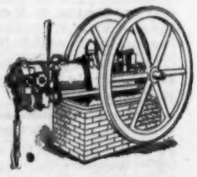

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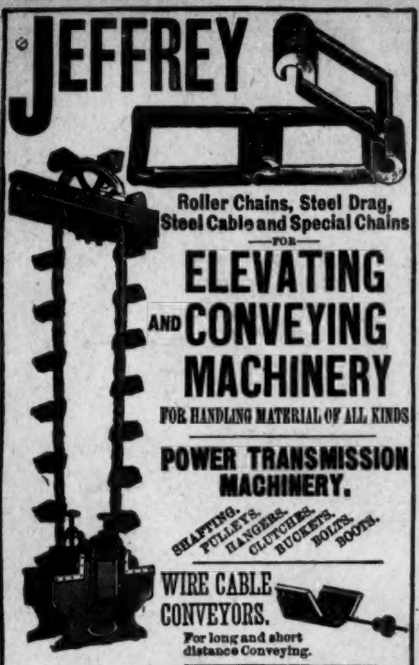

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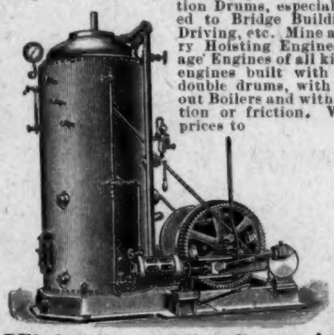

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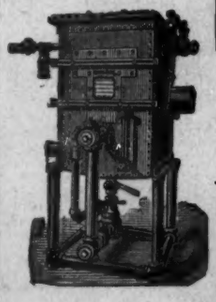

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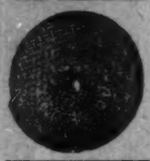

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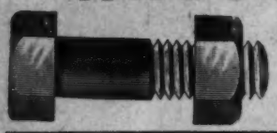

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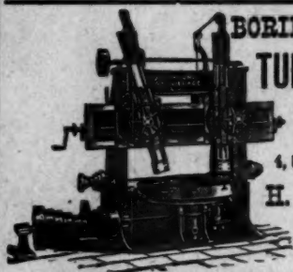

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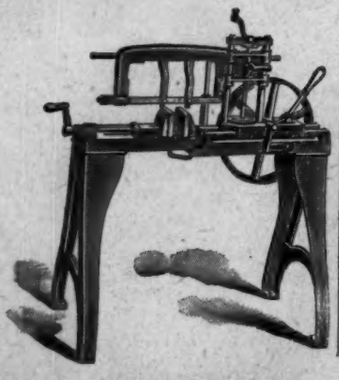

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